Collecting Spatial Model Data Using the

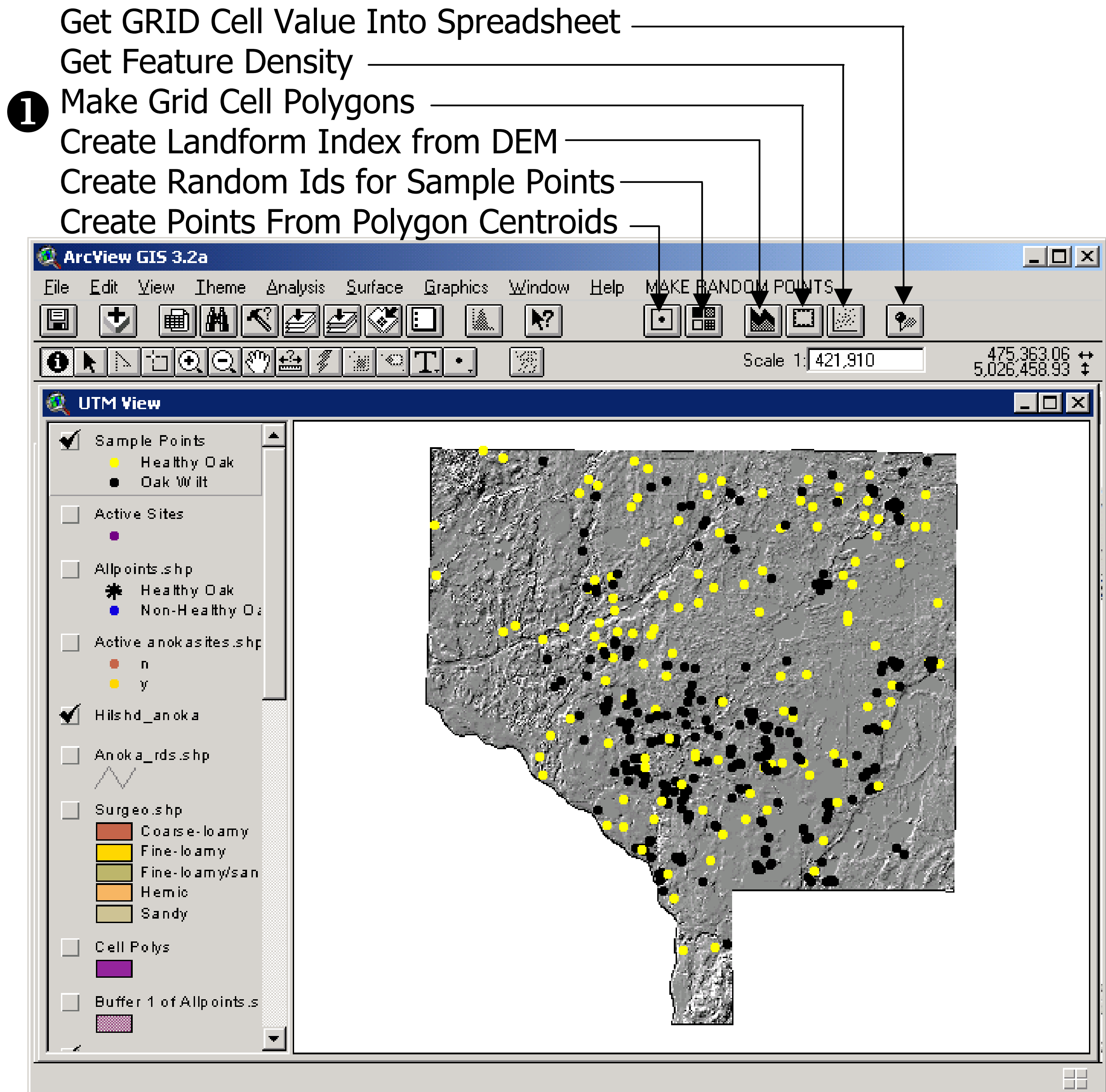
GET-MODEL-DATA

ArcView Application

The ***Get-Model-Data*** ArcView application allows the user to quickly gather sample spatial data that will ultimately be used for spatial modeling. There are five basic steps required for the spatial model. These include:

The custom features of the ***Get GRID Data*** application along with the native functionality of ArcView allow the user to create the **Dependent Sample Data Point** theme and create the **Independent Data** GRID themes required for spatial modeling. These GRID themes may include simply downloading existing GRID data such as DEMs, to creating other GRID themes from existing GRID themes such as slope or landform index, to the creation of GRID themes containing **feature density per unit area** such as stream or road density.

❶ The six Button functions of *Get-Model-Data* ArcView Application.



Random Point Generator (Continued)

GET-MODEL-DATA

ArcView Application

A The ***Get-Model-Data*** ArcView application allows the user to quickly sample the area of interest using one of eleven random point generator routines.

❶ <u>RANDOM POINTS IN THEME EXTENT</u>

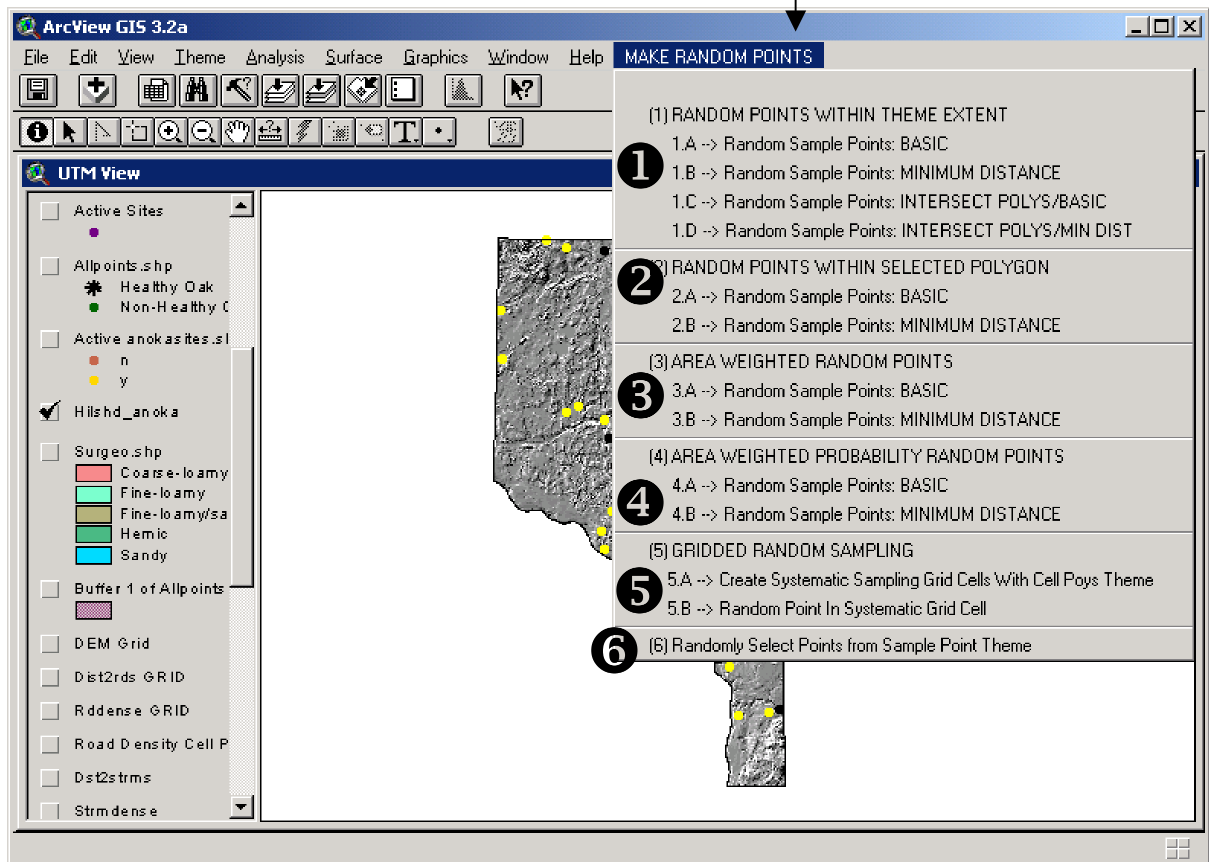
→BASIC: Random points are generated within the themes overall extent. Point pattern is true random with some clustering.

→MIN DISTANCE: Random points are generated within the themes overall extent, however, point pattern is not true random due to user entered minimum distance between points. The pattern will become increasingly regular as the user enters greater minimum distances between points.

→INTERSECT POLYS ONLY/BASIC: Random points are generated within the themes extent ***and*** as long as the point falls within a polygon feature. Point pattern will be true random pattern with some clustering.

→ INTERSECT POLYS ONLY/ MINIMUM DISTANCE: Random points are generated within the themes extent ***and*** as long as the point falls within a polygon feature. The point pattern is not true random due to user entered minimum distance. The pattern becomes increasingly regular with greater minimum distances between points.

A Random Point Generator Options



Random Point Generator (Continued)

GET-MODEL-DATA

ArcView Application

❷ <u>RANDOM POINTS WITHIN SELECTED POLYGON(S)</u>

→BASIC: Random points are generated within the selected polygon or polygons. Point pattern is true random with some clustering.

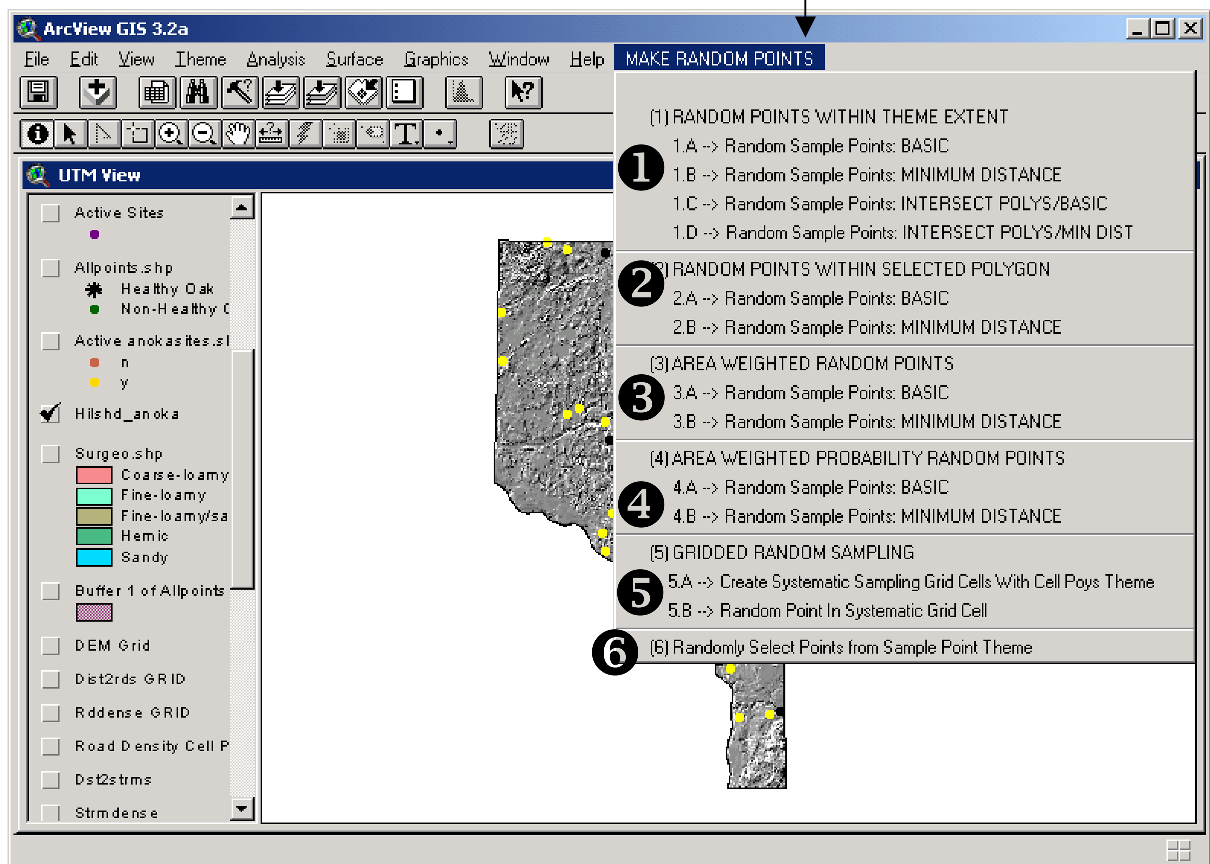
→MIN DISTANCE: Random points are generated within selected polygon or polygons. Point pattern is not true random due to user entered minimum distance between points. The pattern will become increasingly regular as the user enters greater minimum distances between points.

❸ <u>AREA WEIGHTED RANDOM POINTS</u>

→BASIC: Random points are generated within polygon using a user entered maximum number of points in the largest polygon. All other polygons receive a percentage of the maximum based on the area of each polygon in relation to the largest polygon. Point pattern is true random with some clustering.

→ MINIMUM DISTANCE: Same as *BASIC* except that the point pattern is not truly random due to user entered minimum distance between points. The pattern becomes increasingly regular as the user enters greater minimum distances.

A Random Point Generator Options



Random Point Generator

GET-MODEL-DATA

ArcView Application

❹ <u>AREA WEIGHTED PROBABILITY</u>

→BASIC: Random points are generated within the theme polygons. This differs from ❸ *Area Weighted Random Points* because the probability that a polygon will receive a random sample point increases with the size of the polygon. Point pattern is true random with some clustering.

→MIN DISTANCE: Same as BASIC except that the point pattern is not true random due to user entered minimum distance between points. The pattern will become increasingly regular as the user enters greater minimum distances between points.

❺ <u>GRIDDED RANDOM SAMPLING</u>

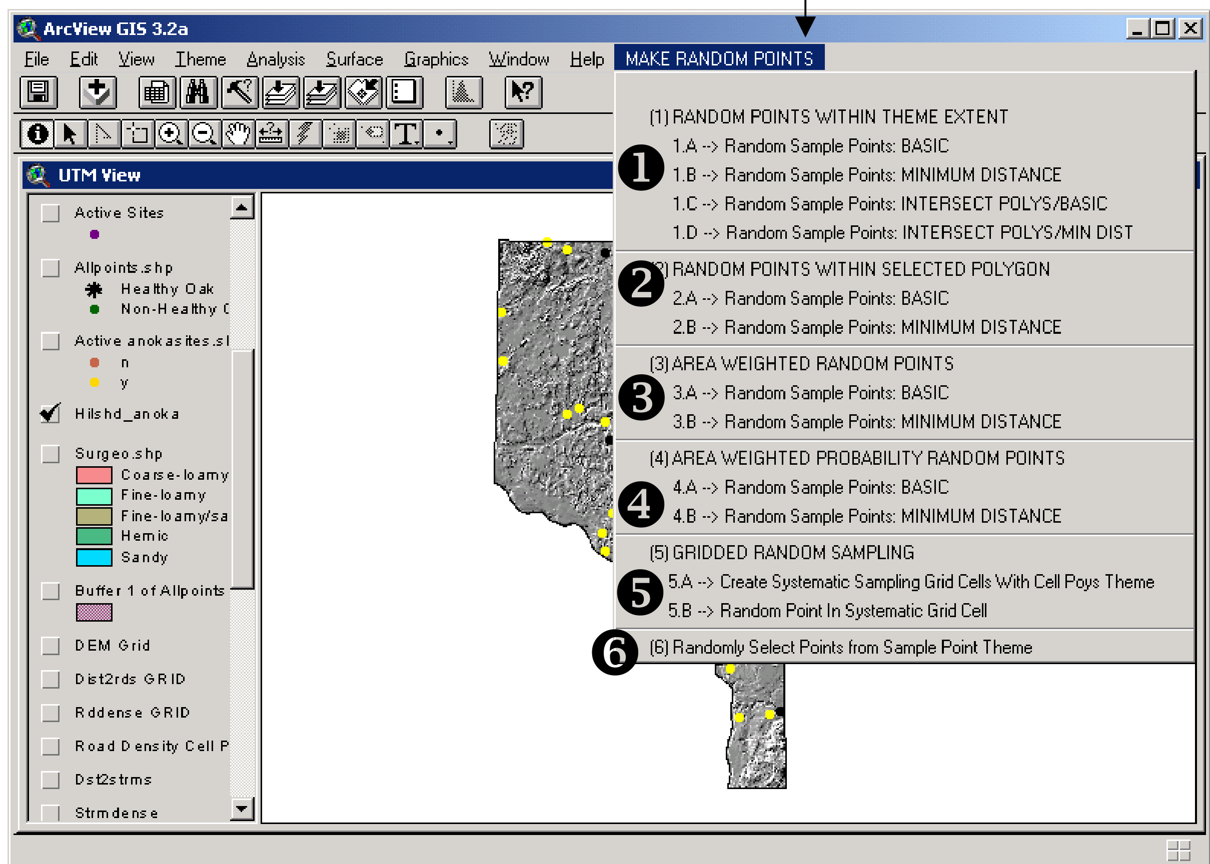
→5A: A grid layout is created over the theme extent where the size of the grid cells are defined by the user.

→5B: A single random point is then placed within each grid cell area as long as it intersects a polygon. This creates a uniform distribution of sample points where points can be no further than two cell widths from each other, any points can potentially be located next to a point in an adjacent cell, or any distance in between.

❻ <u>RANDOM SELECTION OF POINTS</u>

This function allows the user to randomly select points from the exiting points theme.

A Random Point Generator Options

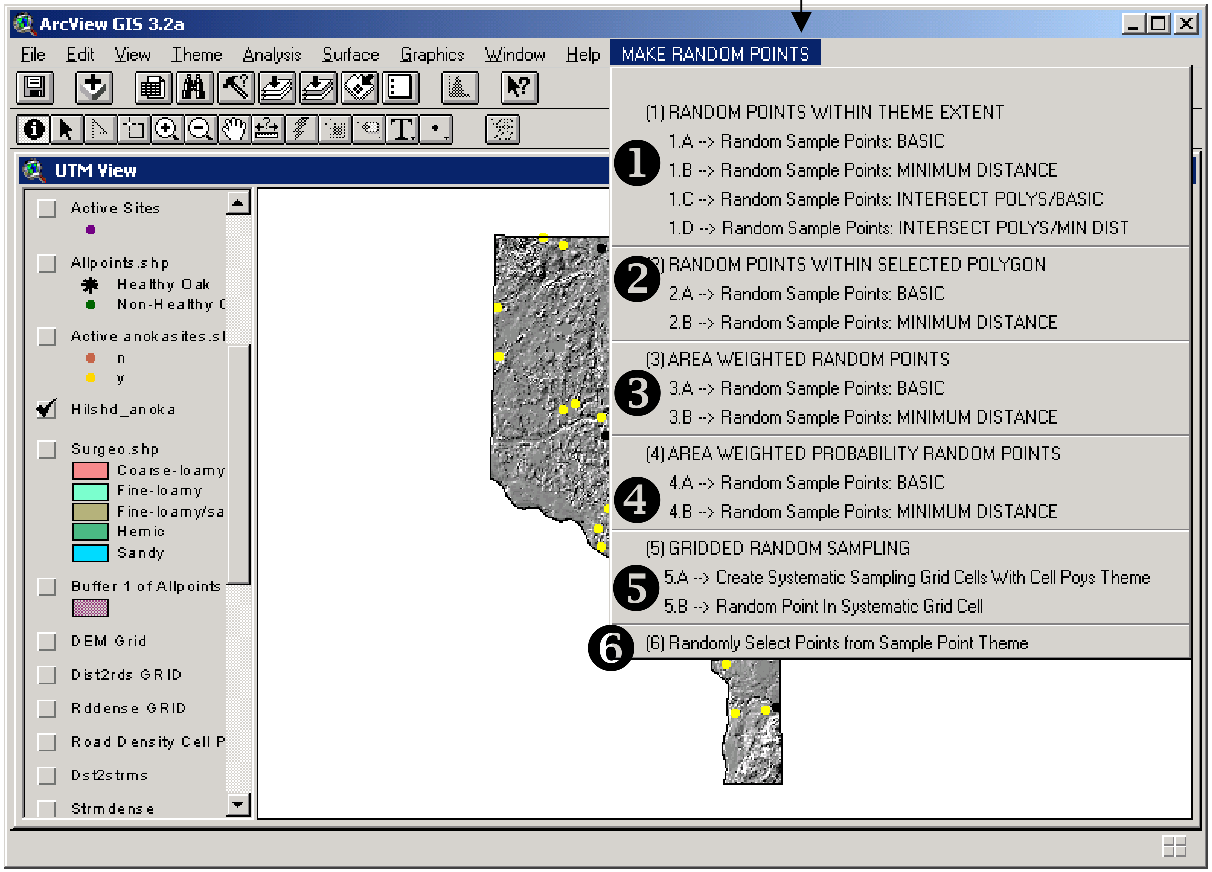


Random Point Generator
GET-MODEL-DATA
ArcView Application

❻ <u>RANDOM SELECTION OF POINTS</u>

This function allows the user to randomly select points from the exiting points theme.

A Random Point Generator Options



(I)
Loading ArcView GeoProcessing Wizard

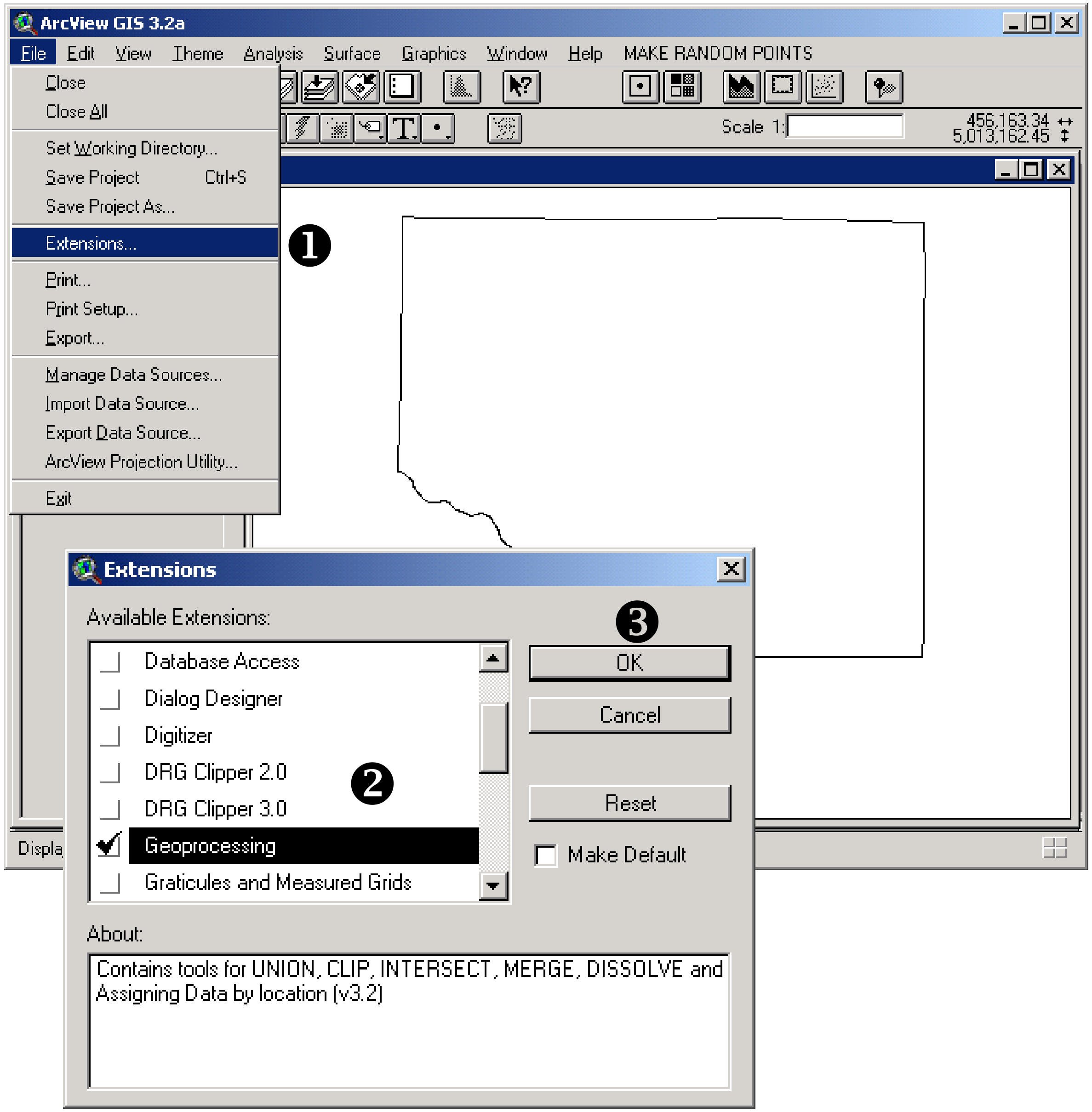
Before starting, make sure the ArcView **GeoProcessing Wizard** is loaded into the GET-DATA-MODEL ArcView project. The *Geoprocessing Wizard* will allow you to manipulate feature themes such clipping, merging, or intersecting two themes.

❶ Click on the **Extensions…** item under the **File** pull-down menu.

❷ Scroll down and click on the **Geoprocessing** option. If you see a check mark appear then it is selected.

❸ Click the **OK** button and the extension. will automatically load into the ArcView project. You can find it under the **View** pull-down menu (refer to next page).

NOTE: Use this technique to load any ArcView extension



(I)
Create The Dependent Data Theme

The first step requires the creation of a *Point Theme* that are the sample points. In our example, the points were from disparate sources of both healthy oak and "non-healthy" oak. Some of the points were already in a point theme while other point(s) had to be generated using the custom function to make polygon centroid points.

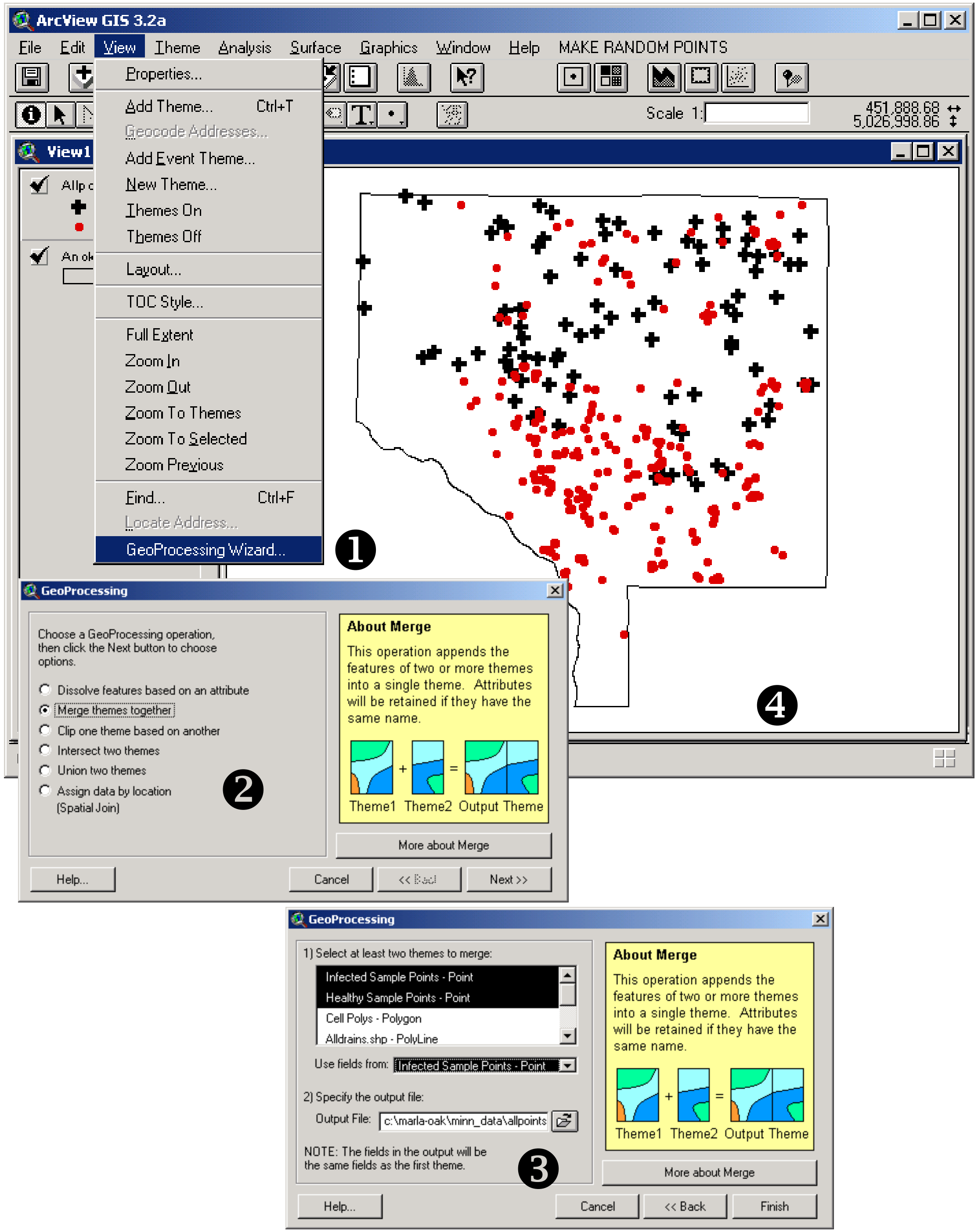
The "healthy" and "non-healthy" point themes were then **merged** together to create a point theme that contains all sample points. Follow the the steps below to merge two or more point themes:

❶ Click on the **GeoProcessing Wizard** item under the **View** pull-down menu.

❷ Select the **Merge themes together** option and click the **Next>>** button.

❸ Select the themes to merge and name the new merge file in the **Output File:** box. Click the **Finish** button to start the themes merge.

❹ ArcView will add the new theme to the view.



(I)
Create The Dependent Data Theme
Using the Create-Poly-Centroid function

Dependent data point can be created from polygon themes. For example, Oak Wilt areas may have been GPS'd as a small polygon rather than a single tree point. However, for spatial modeling, the dependent variable must in point form. As a result, taking the centroid of the polygon will create a point from the sampled area polygon.

❶ Create a new Point theme and add two. attributes; 1) **xcentroid**, and 2) **ycentroid** to the theme table.

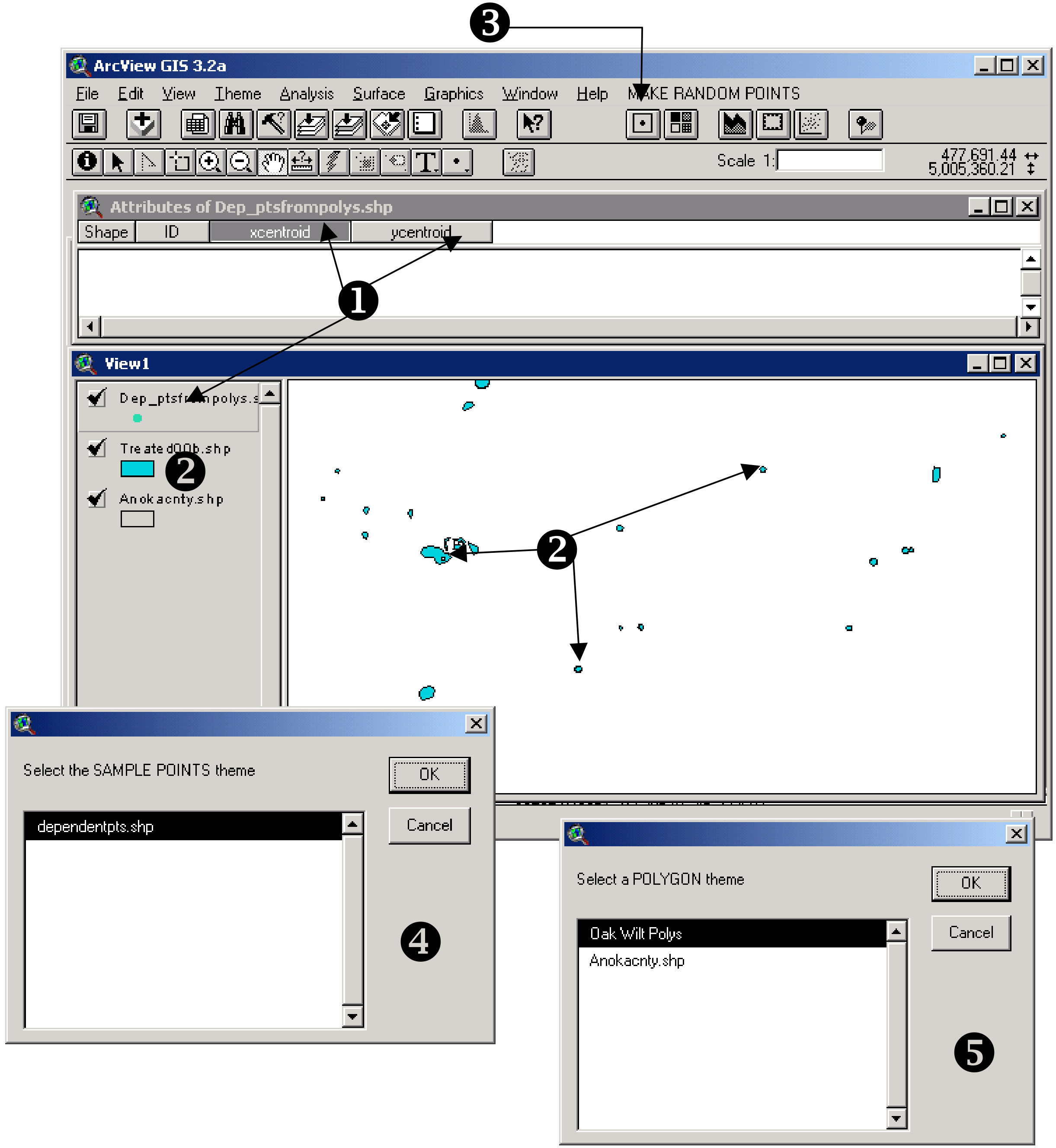
❷ Notice the *Oak Wilt Polys* theme has various size polygons. It is important to consider the polygon size because using a single point for a large polygon may not Be an appropriate sample.

❸ Click on the **Create Polygon Centroids Button** and the **Select SAMPLE POINTS Theme** dialog window opens.

❹ Select the sample point theme and click the **OK** button.

❺ The **Select POLYGON Theme** dialog window opens. Select the polygon theme and click the **OK** button.

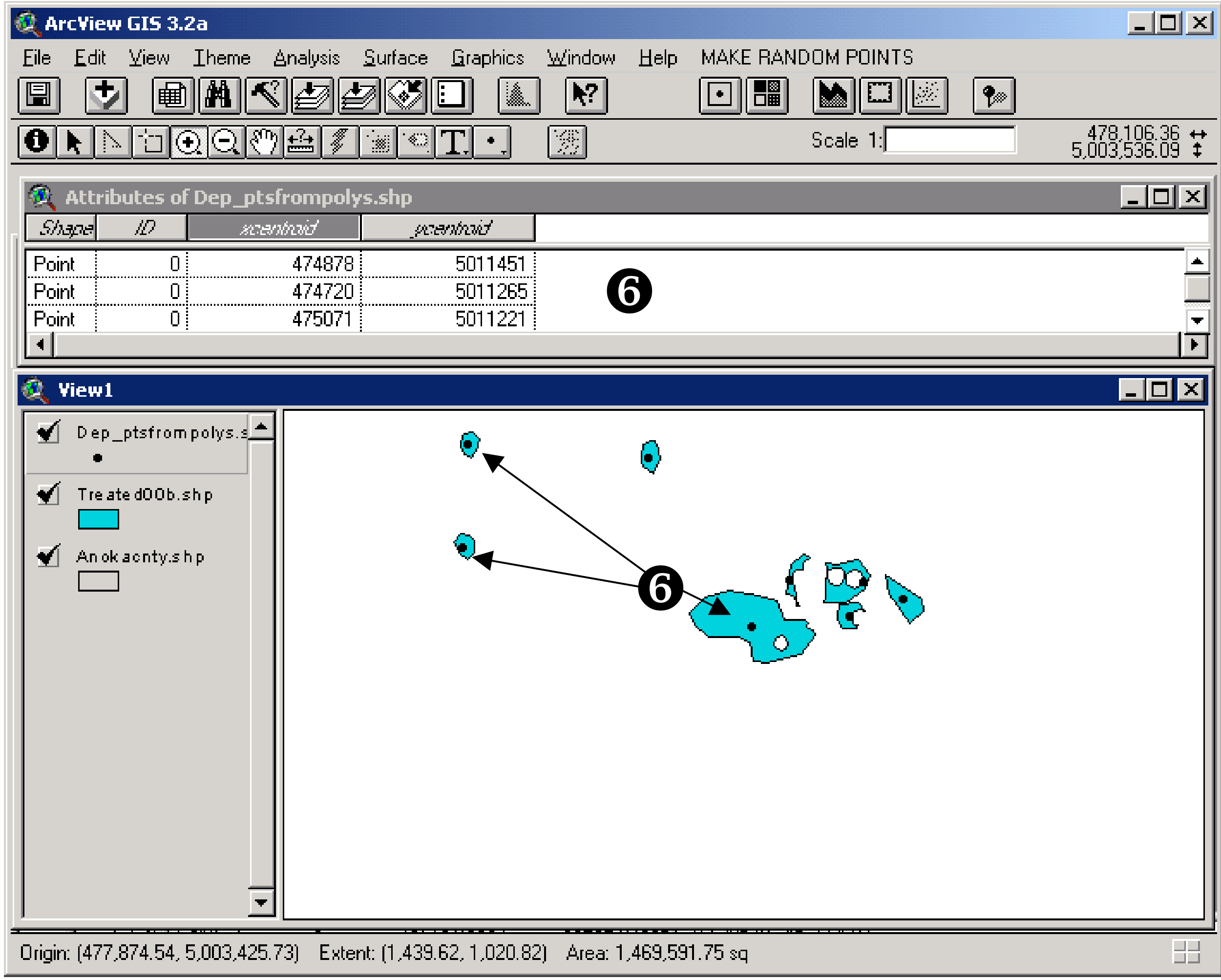
(Continued)



(I)
Create The Dependent Data Theme
Using the Create-Poly-Centroid function

❻ The system automatically calculates and Loads the new centroid points into the point Theme table.

These points can then be merged with other dependent data themes (page 6).



(II)
Creating Independent Data Themes
Five Methods to Create GRIDS

Independent Data is used to describe the *Dependent Variable*. Independent data that may be useful to describe the dependent variable include physiographic (DEM, aspect, slope), climatic (precipitation), Landsat TM, soils, and Urban Features. All independent data themes need to be in GRID format. Many themes may start out as polygon, line, or point, but will need to be converted to a GRID. Other data such as a DEM or Landsat bands are already in raster format from which the GRIDs can easily be created. Common methods to create or convert to GRID coverages include:

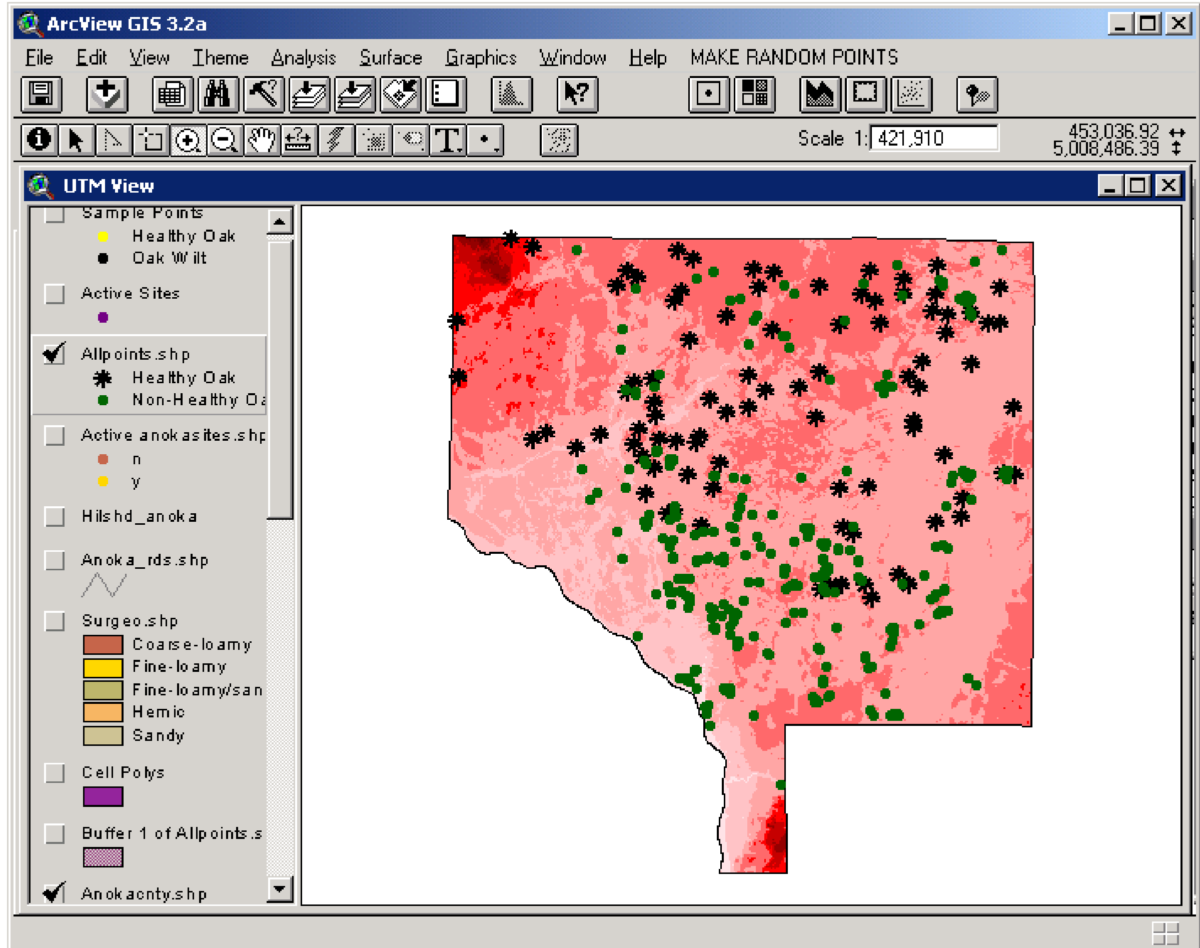
1) **Create slope, aspect, and landform from a DEM (pp. 11 - 13),**

2) **Create GRIDs from individual Landsat TM bands in *ERDAS Imagine* (pp. 14).**

3) **Create GRID themes from polygon feature themes (page 15),**

4) **Make Distance-From-Line-Features GRIDs (page 16), and**

5) **Create <u>Line Density</u> GRID(s) that contains the total length of line feature per unit area (pp. 17 – 21).**



(II)
GRID Surfaces Created from a DEM
Creating a SLOPE Grid

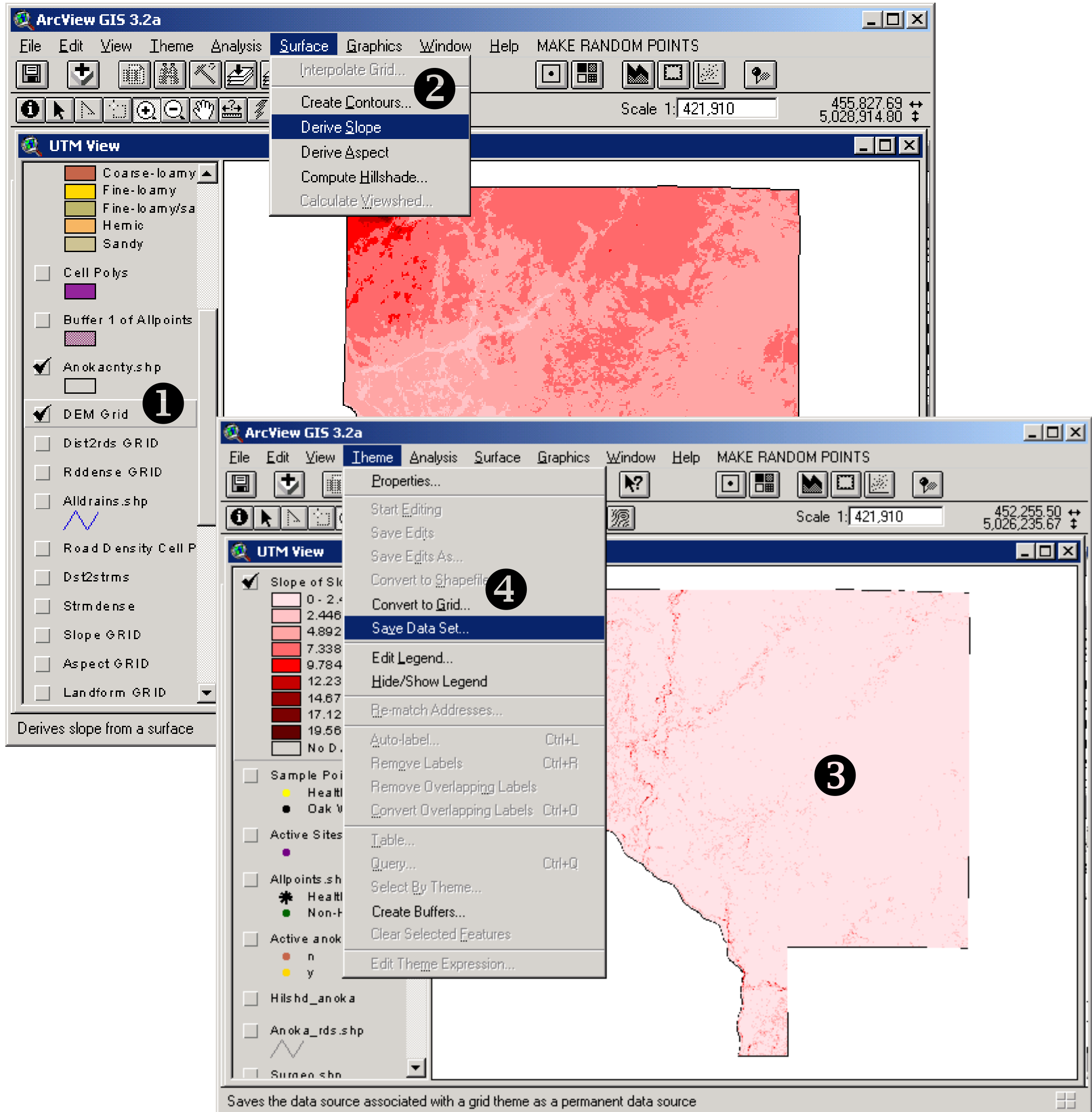
ArcView *Spatial Analyst* extension allows the user to quickly and easily create **slope** and **aspect** GRID surfaces. Look for the **Analysis**, **Surface**, and **Transform Grid** menu pull-downs. If you cannot see these menus, then the Spatial Analyst extension has not been turned on. Refer to page 2 to load an extension.

❶ Make sure the DEM Grid theme the active theme in the View's Theme *Table of Contents* (TOC). Spatial Analyst will perform a slope analysis on any selected Grid theme.

❷ Click on the **Derive Slope** item under the **Surface** menu pull-down.

❸ Spatial Analyst will immediately begin to create the new slope surface. When finished ArcView automatically loads the new Grid in the TOC.

❹ This new Grid is a temporary file and the user should save the temporary Grid theme to a permanent file. Select either the **Convert to Grid** or the **Save Data Set** item under the **Theme** menu pull-down and save the new slope Grid to the desired location with the desired name.



NOTE - Find DEM data at: http://edcnts14.cr.usgs.gov/Website/seamless.htm

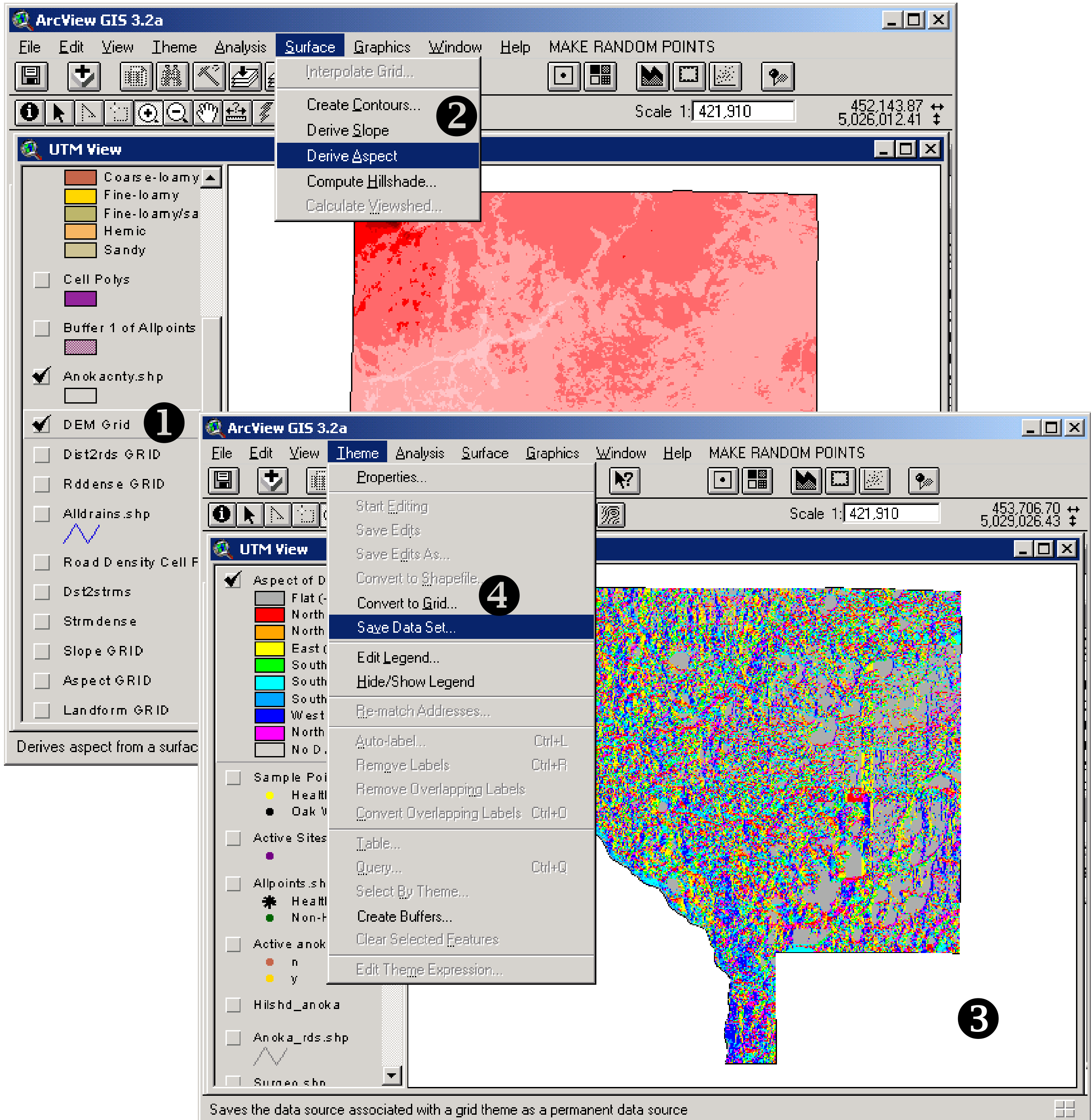
(II)
GRID Surfaces Created from a DEM
Creating a ASPECT Grid

❶ Make sure the DEM Grid theme the active theme in the View's Theme *Table of Contents* (TOC). Spatial Analyst will perform a slope analysis on any selected Grid theme.

❷ Click on the **Derive Aspect** item under the **Surface** menu pull-down.

❸ Spatial Analyst will immediately begin to create the new aspect surface. When finished ArcView automatically loads the new Grid in the TOC.

❹ This new Grid is a temporary file and the user should save the temporary Grid theme to a permanent file. Select either the **Convert to Grid** or the **Save Data Set** item under the **Theme** menu pull-down and save the new slope Grid to the desired location with the desired name.



(II) GRID Surfaces Created from a DEM

Creating a LANDFORM INDEX Grid

Using a DEM, this function allows user to create a new GRID containing landform index values where positive values indicate concavity (depression, drainage), negative values indicate convexity (nob, hilltop), and zero indicating flat surface. Values are independent of slope. The neighborhood kernel used is an irregular 3X3 matrix

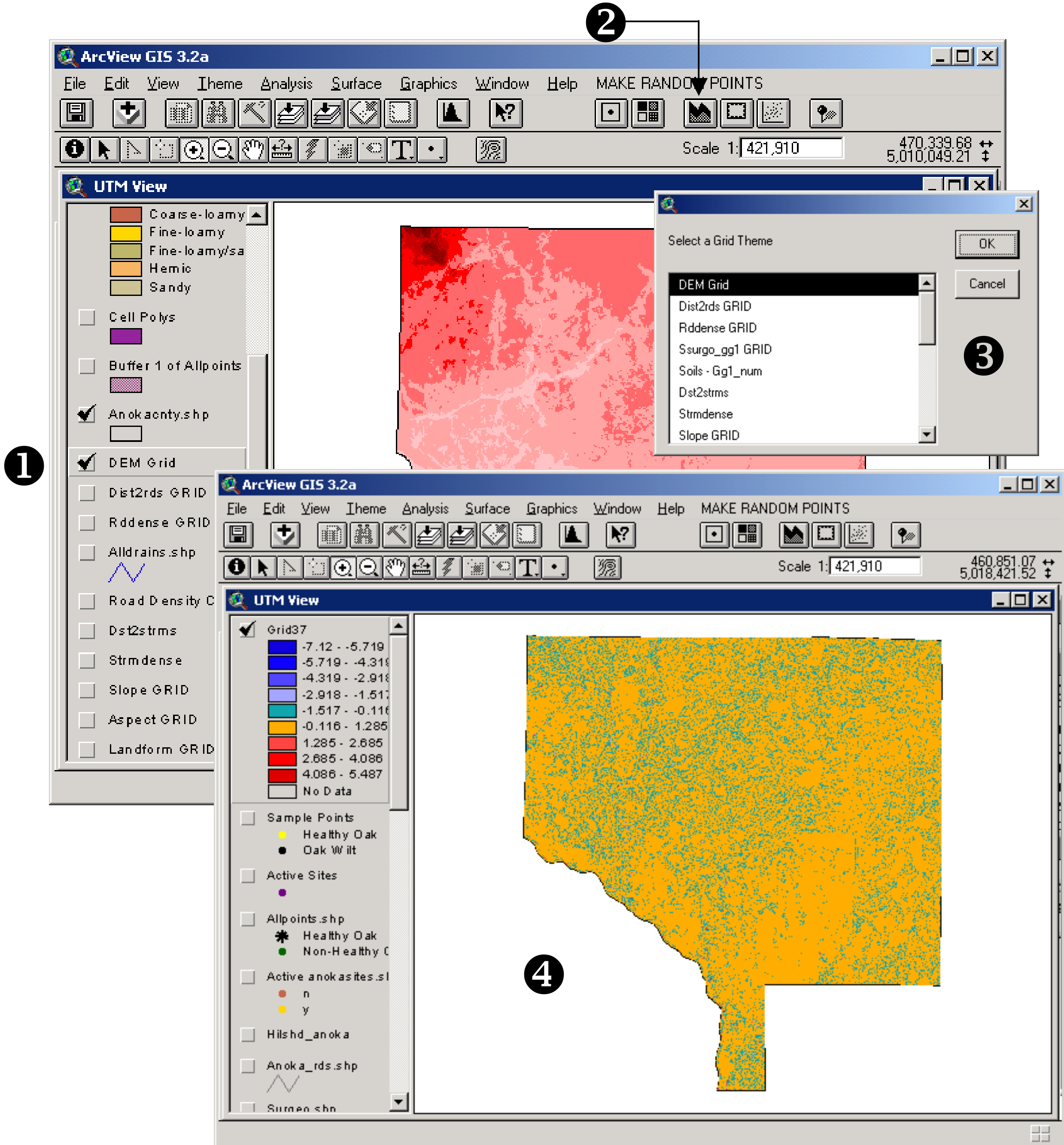
0,1,0
1,1,1
0,1,0

❶ Make sure the DEM Grid theme the active theme in the View's Theme *Table of Contents* (TOC).

❷ Click on the **Create Landform** button.

❸ The **Select a Grid Theme** input dialog opens. Select the DEM Grid theme. The Landform is automatically created and ArcView automatically loads the new Grid in the TOC.

❹ Select either the **Convert to Grid** or the **Save Data Set** item Under the **Theme** menu pull-down and save the new landform index Grid to the desired location with the desired name (see previous page).



(II)
GRID Surfaces Created from Landsat
Creating a Individual Band Grids in Imagine

ERDAS Imagine allows the user to quickly export an entire multi-band Imagine file into separate Arc Grids. Each wavelength band must be a separate Grid theme for the spatial modeling process. This will create as many Grid themes as there are image bands. In the example, the image has 14 wavelength bands and will produce 14 Grid themes.

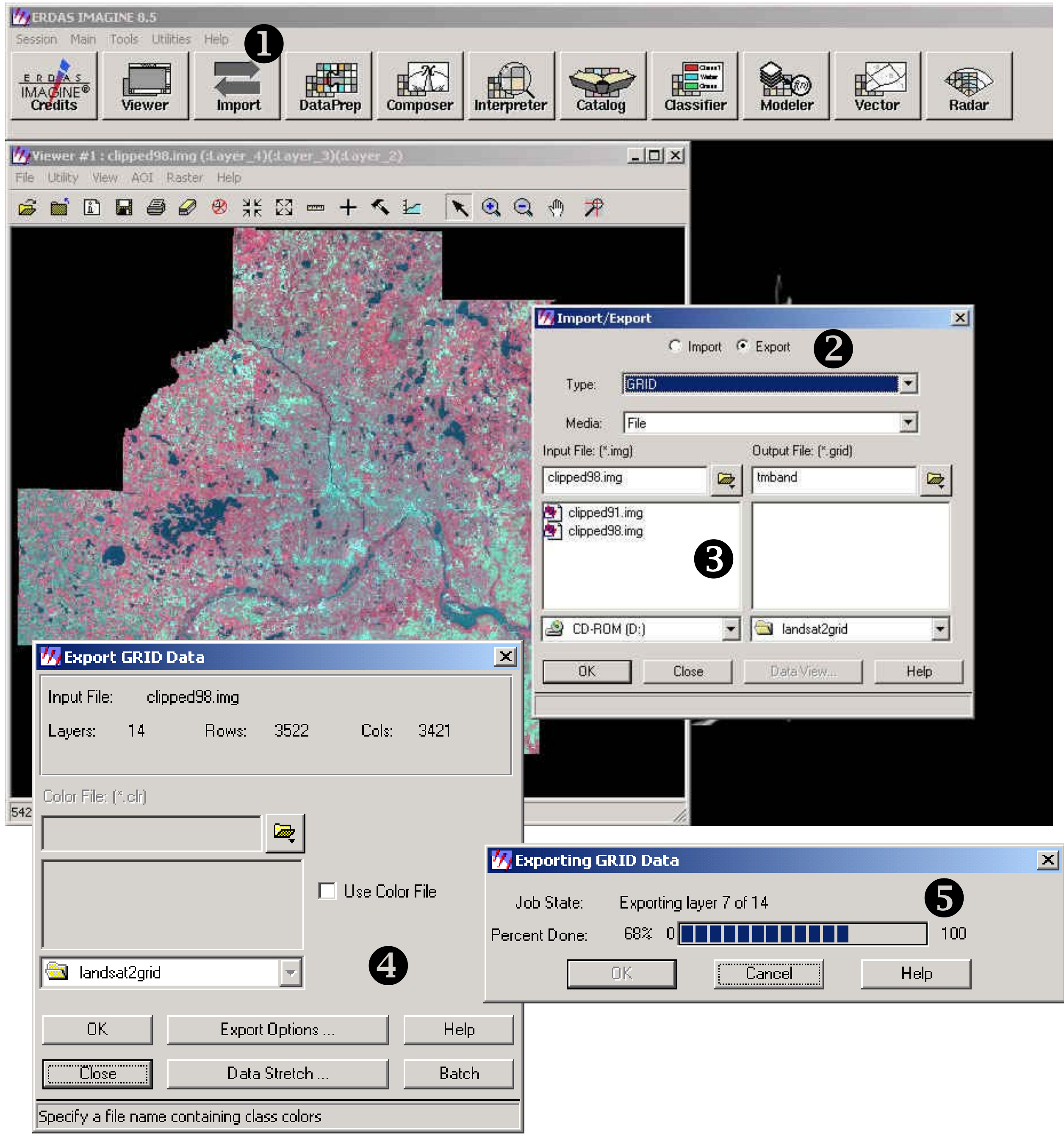
❶ Click on the **Import** button to open the **Import/Export** dialog window

❷ Under the **Import/Export** window select the **Export** option and select GRID under the **Type:** input line.

❸ Under the **Input File(*.img)** input box, browse to the appropriate Landsat TM Imagine file. Under the **Output File(*.grid)** input box, browse to the location to place the new Landsat Grids. Keep output name short (<= 7 characters) Click **OK** when done.

❹ The **Export GRID Data** dialog opens. Click the **OK** button to start exporting.

❺ A job status dialog appears. When completed, click the **OK** button. The new Grids are now created.



(II)
Create GRID Themes From Polygon Feature Themes

❶ Click on the **Convert to Grid** item under the **Theme** menu pull-down.

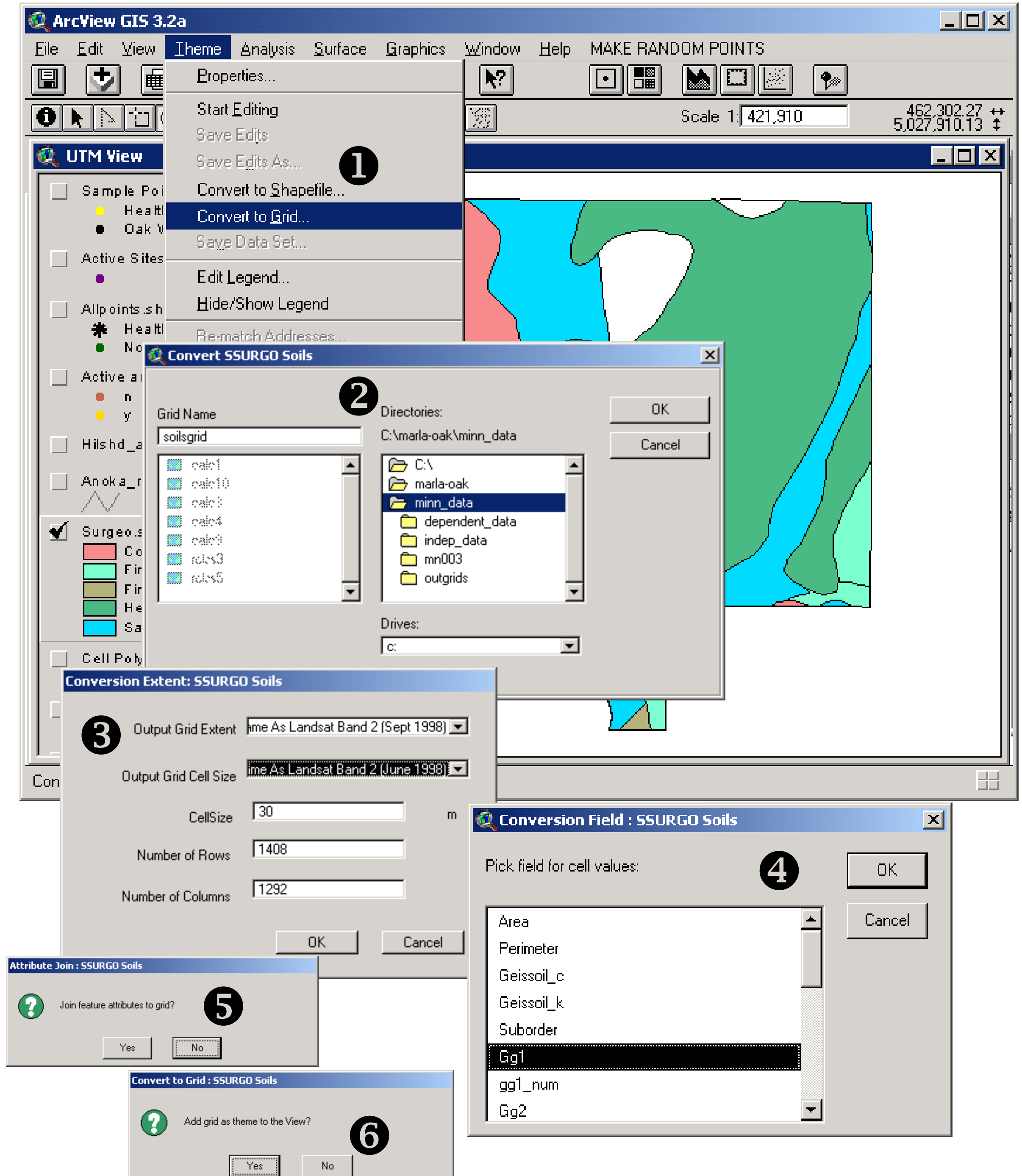
❷ The **Convert *Theme*** dialog appears. Browse to the desired directory for the new GRID coverage and enter a name for the new GRID. Click The **OK** button to go to the next dialog.

❸ The **Conversion Extent *Theme*** dialog appears. Set the **Output Grid Extent** to any of the Landsat TM GRID bands. Also set the **Output Grid Cell Size** to the Landsat TM GRID. You will then see the cell size, number of rows, and number of columns that will be in the new GRID. Click the **OK** button to go to the next dialog.

❹ The final dialog appears titled **Conversion Field: *Theme***. Select the appropriate attribute that will be used to label the cell values in the new GRID. Click **OK**.

❺ Click the **Yes** button to join attributes.

❻ Click the **Yes** button to add the new GRID to the View window



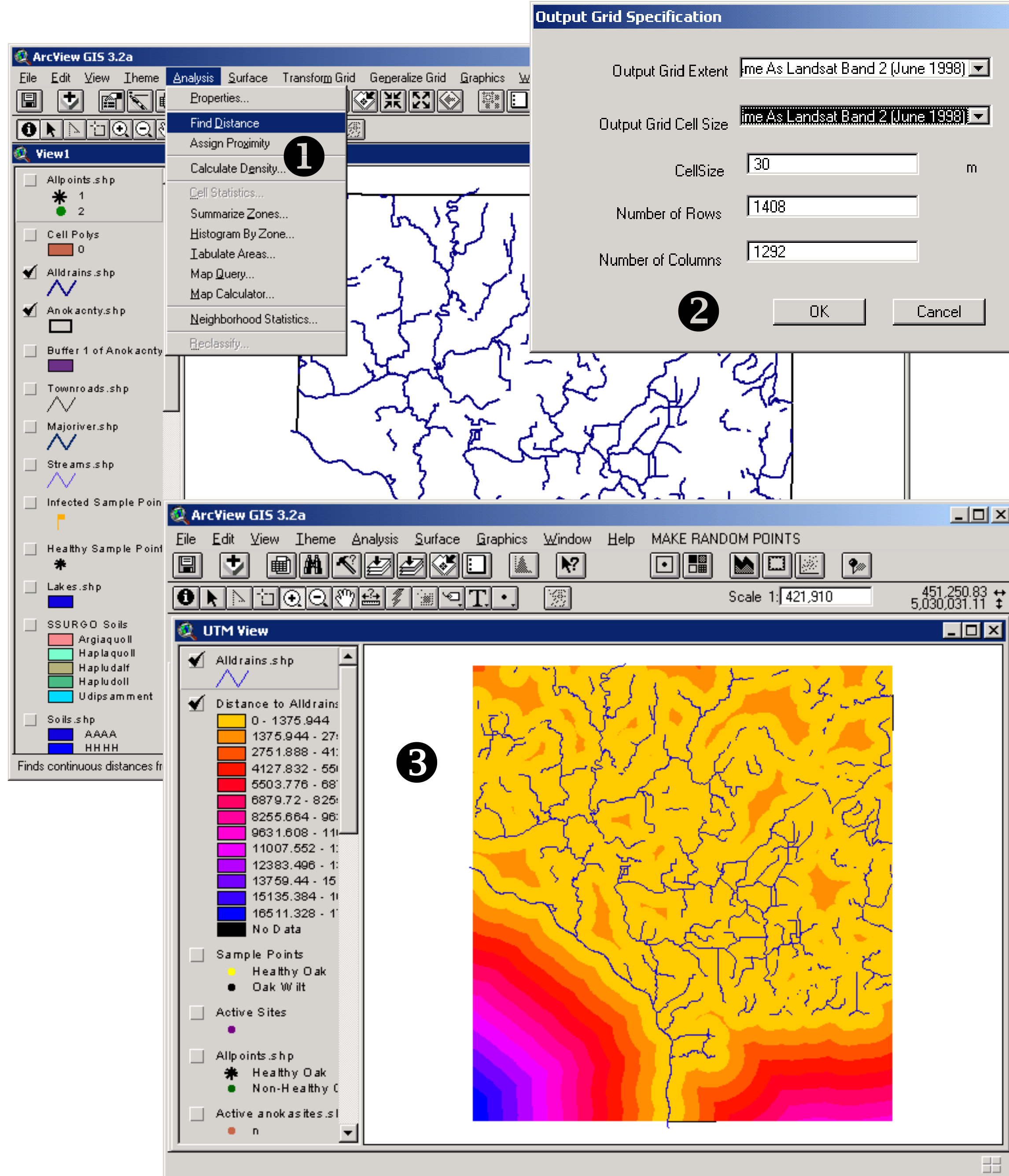
(II)

Make Distance-From-Features GRIDs

❶ Click on the **Find Distance** item under the **Analysis** menu pull-down (make sure the *Spatial Analyst* extension is turned on).

❷ The **Output Grid Specifications** dialog appears. Set the **Output Grid Extent** to any of the Landsat TM GRID bands. Also set the **Output Grid Cell Size** to the Landsat TM GRID. You will then see the cell size, number of rows, and number of columns that will be in the new GRID. Click the **OK** button to go to the next dialog.

❸ ArcView will automatically add the new GRID to the View.



(II)
Create Line Feature Density GRID
Start Up Line Feature Density

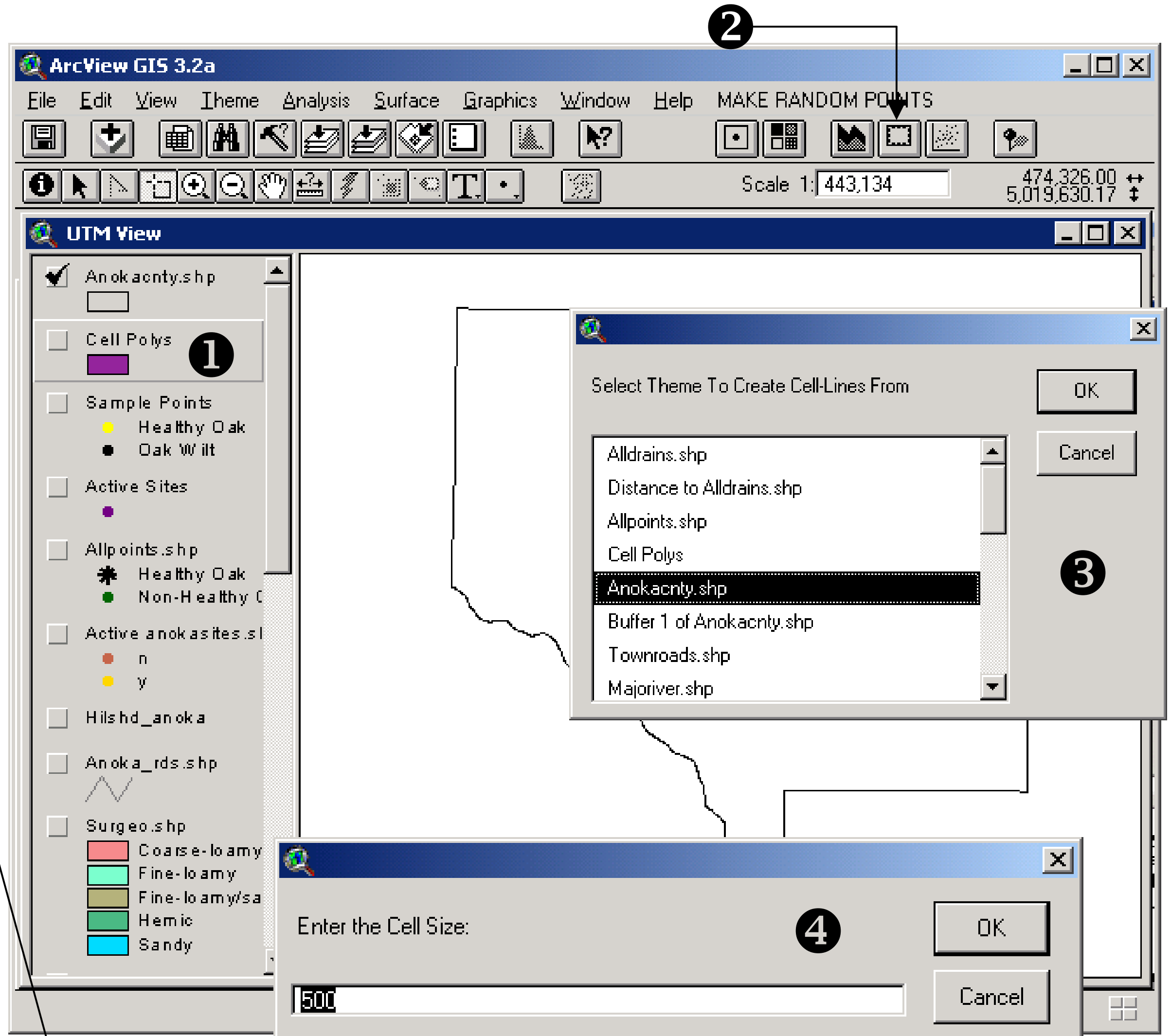
❶ NOTE: Make sure the *Cell Polys* theme is loaded into the View. If you do not have a Cell Polys line feature theme, then you will need to add it. To do this, click on the **New Theme…** item under the **View** menu pull-down. This will open the **New Theme** dialog Scroll to and select **Polygon** under the **Feature Type** box. Name the theme *cellpolys.shp*. Add the theme to the View and **make sure the TOC name is changed to *Cell Polys***.

❷ Click on the **Make Poly Cells** button to start creating the "cells" polygon features.

❸ Select the polygon theme from which you want to create cells. In this example, polygon cells will be made from the *Anoka County* theme.

❹ The user is then prompted to enter the cell dimension. In the example, cell size is 500X500 units. The cell size will be based on the units stipulated in the View properties. In this case, the units are **meters** (500 meters). The function then begins to build the new polygon cell theme. Depending on the extent of the selected polygon and the cell size entered, the process can take anywhere from a few minutes to an hour.

(Continued)

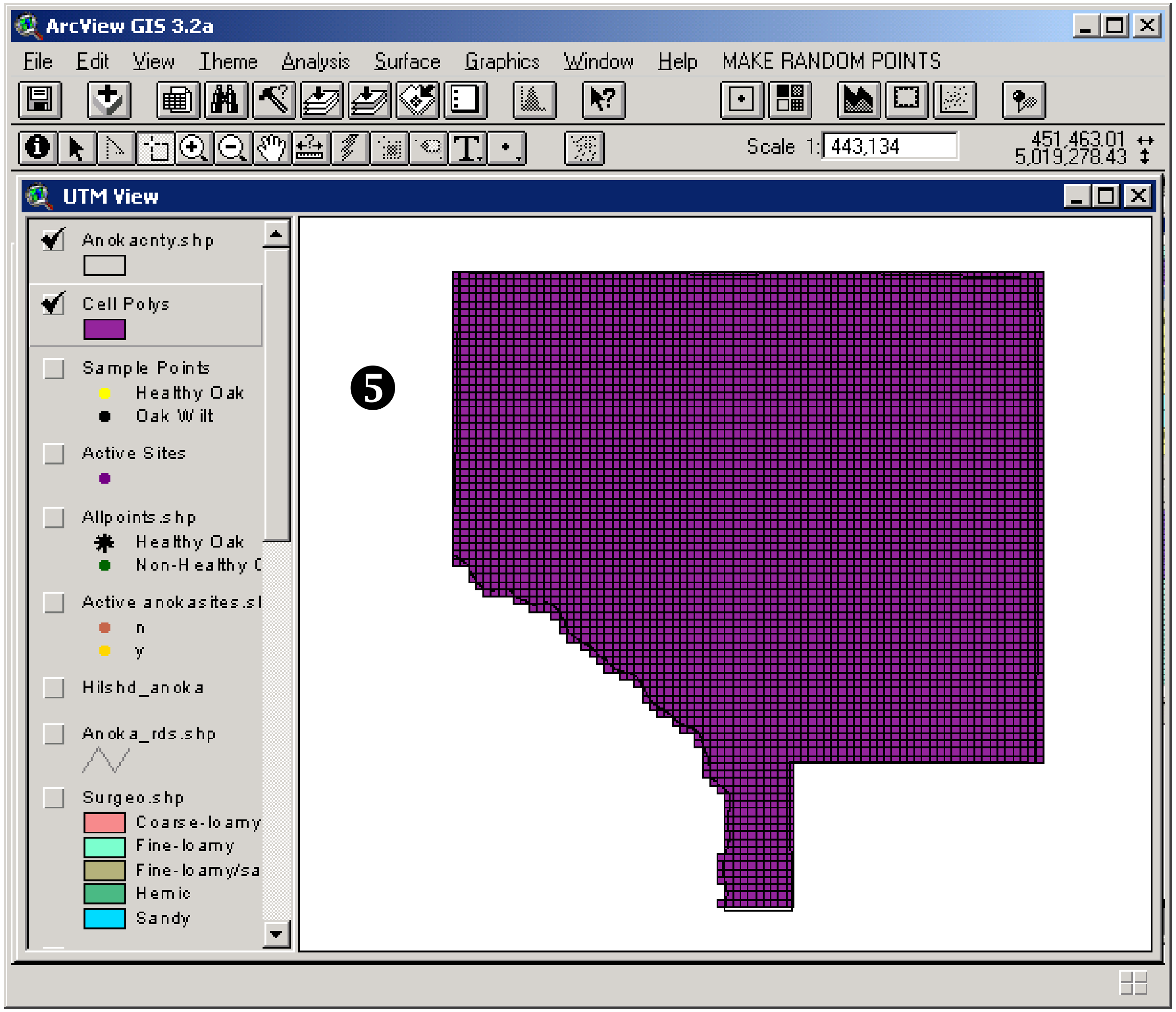


NOTE: Before going onto Step 2, make sure that the polygon from which the cells will be created is selected. This is needed because the ***Cell Polys*** theme works on a single polygon feature. This allows the user to select from a polygon theme with more than one polygon record. For example, the user selects Anoka County from a theme containing the counties of Minnesota.

(II)
Create Line Feature Density GRID
Cell Polygon Theme

❺ The function creates a polygon cell file "clipped" to the actual boundary of the study area. This theme will then be used to calculate density of line features per unit area such as roads and streams (see next page).

(Continued)



(II)
Create Line Feature Density GRID
Calculate Line Density Per Cell

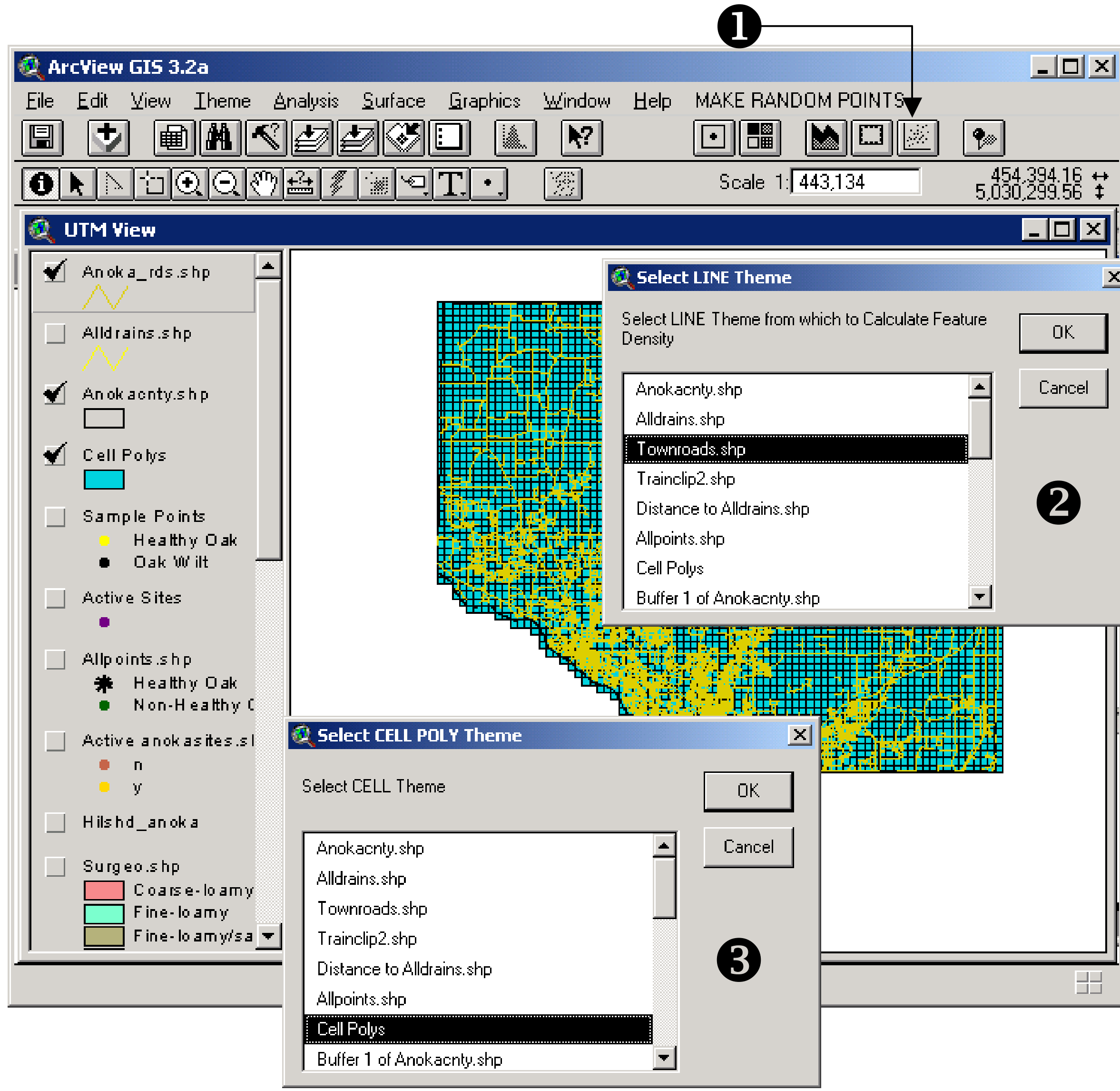
The next step is to calculate line density for each cell polygon record.

❶ Select the **Get Feature Density** button to open the **Select LINE Theme** selector dialog.

❷ Select the desired line feature theme and click the **OK** button to open the **Select CELL POLY Theme** selector dialog.

❸ Select the *Cell Polys* theme in the **Select CELL POLY Theme** dialog and click the **OK** button to start calculating density. This may take a few minutes to an hour depending on the number or *Cell Polys* records and the number of line features in the line theme.

(Continued)



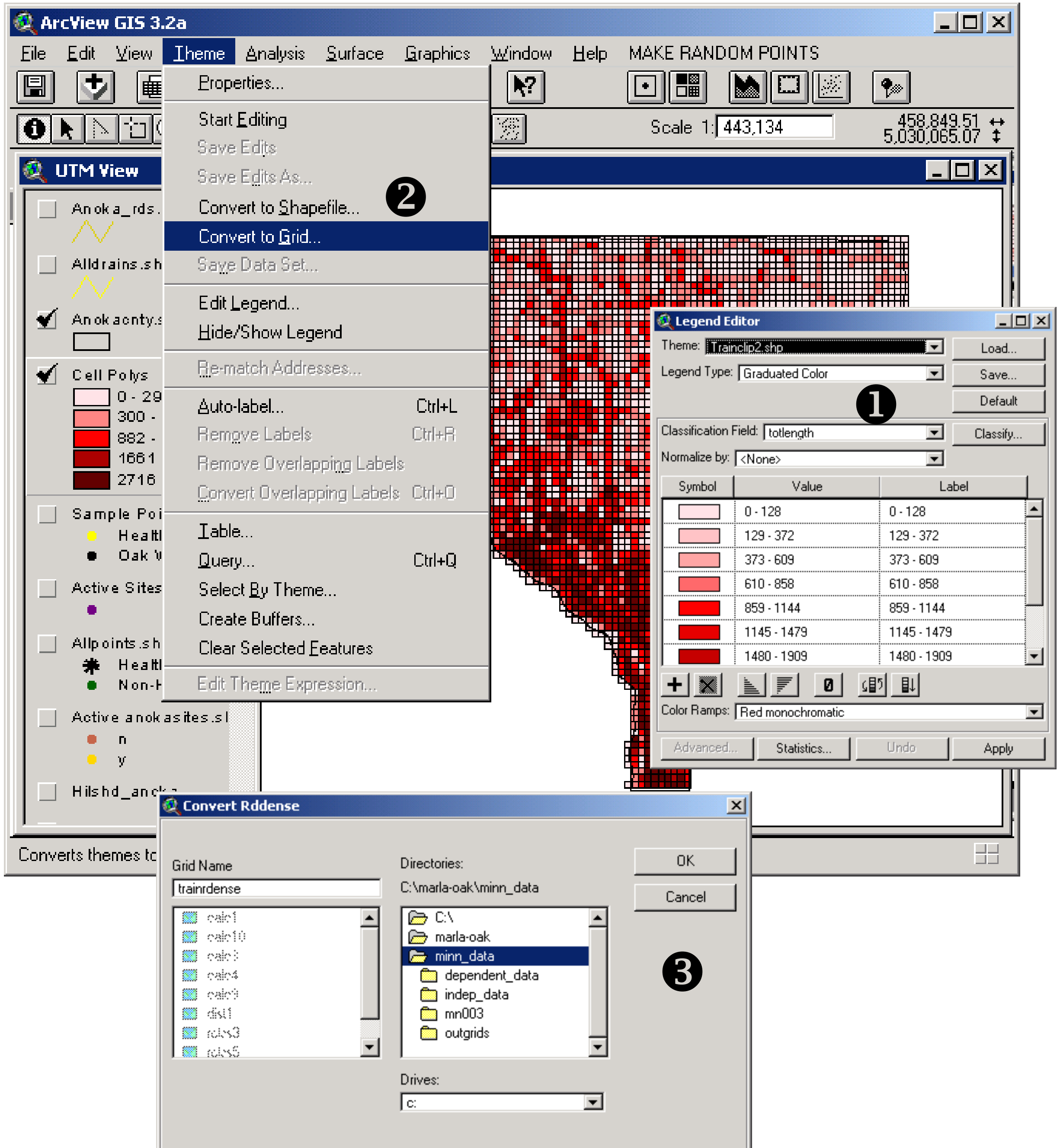
(II)
Create Line Feature Density GRID
Convert Cell Polys Density Theme To GRID

❶ Open the **Legend Editor** for the clipped. cell polys theme and set to **Graduated Colors** on the **totlength** attribute. Set to any color and click on the **Apply** button. This will display the different density levels of each cell polygon.

❷ Next, select the **Convert To Grid** item under the **Theme** menu pull-down to open the **Convert** dialog.

❸ Browse to the appropriate directory location and enter a name for the new GRID. click the **OK** button.

(Continued)



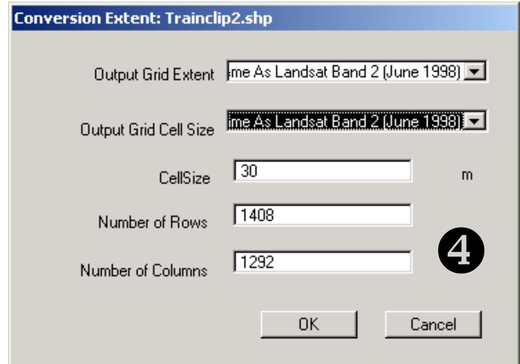
(II)
Create Line Feature Density GRID
Convert Cell Polys Density Theme To GRID

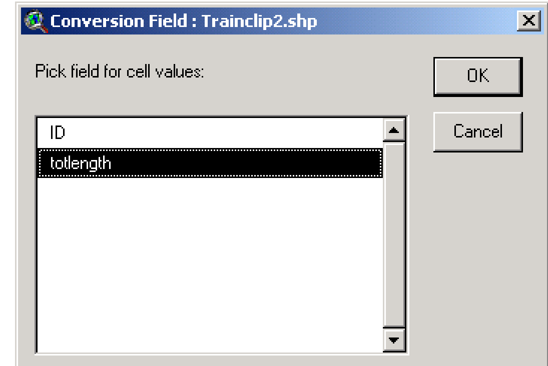
❹ The **Conversion Extent** ***Theme*** dialog appears. Set the **Output Grid Extent** to any of the Landsat TM GRID bands. Also set the **Output Grid Cell Size** to the Landsat TM GRID. You will then see the cell size, number of rows, and number of columns that will be in the new GRID. Click the **OK** button to go to the next dialog

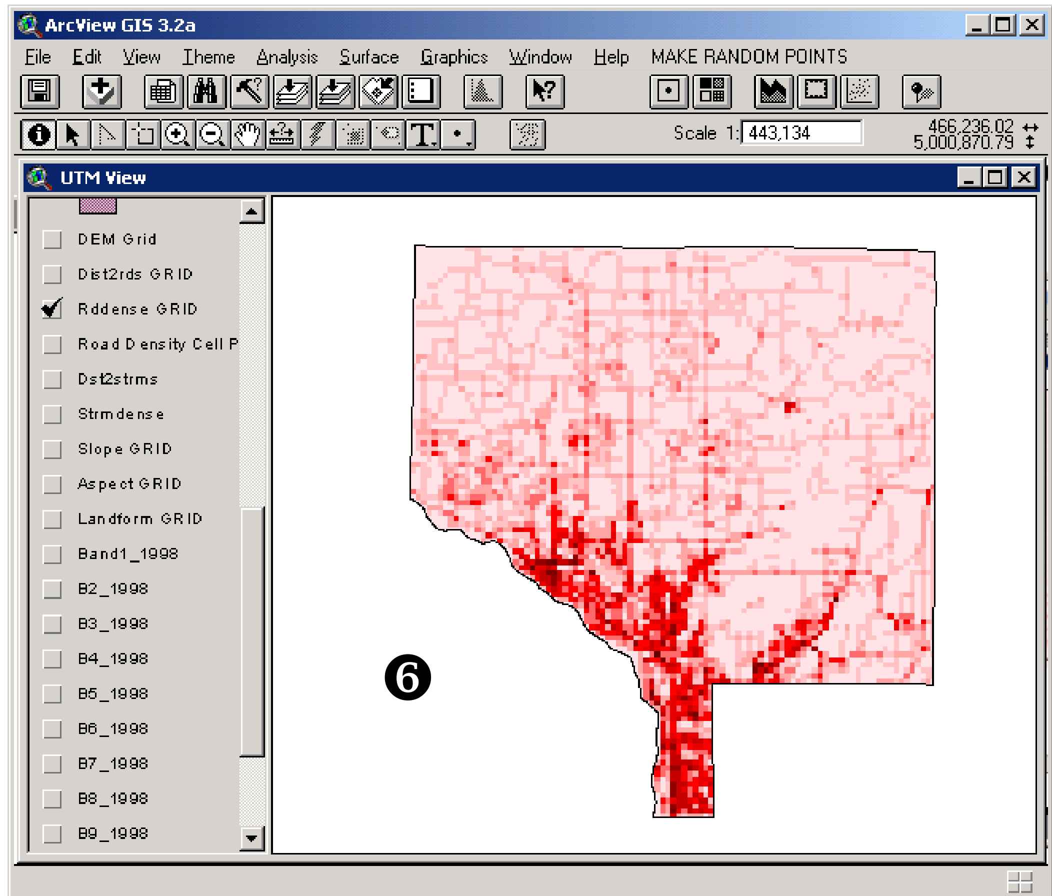
❺ The **Conversion Field:** selector window opens. Select the **totlength** field as the cell label field. Click the **OK** button. Click **Yes** to the *join attributes* and to the *add GRID* dialog question boxes to the View.

❻ Change the legend of the new GRID to an appropriate graduated color scheme.

The GRID is now ready to use as an Independenet Dataset.







(II)
Clipping GRID Surfaces
Using GRID ANALYST extension

The Grid Analyst ArcView extension allows, among others, the clipping of Grid themes using a polygon shape file. This is very useful when creating Independent GRID data themes. It also reduced the file sizes to the their minimum which speeds up creation and analysis.

To get the *Grid Analyst* ArcView extension, go to the the following ESRI Arc Scripts Web page: (http://gis.esri.com/arcscripts/index.cfm), then type in ***grid analyst*** in the **Key Words** slot and download the extension.

❶ Make sure the Grid you want to clip is the Active theme in the TOC.

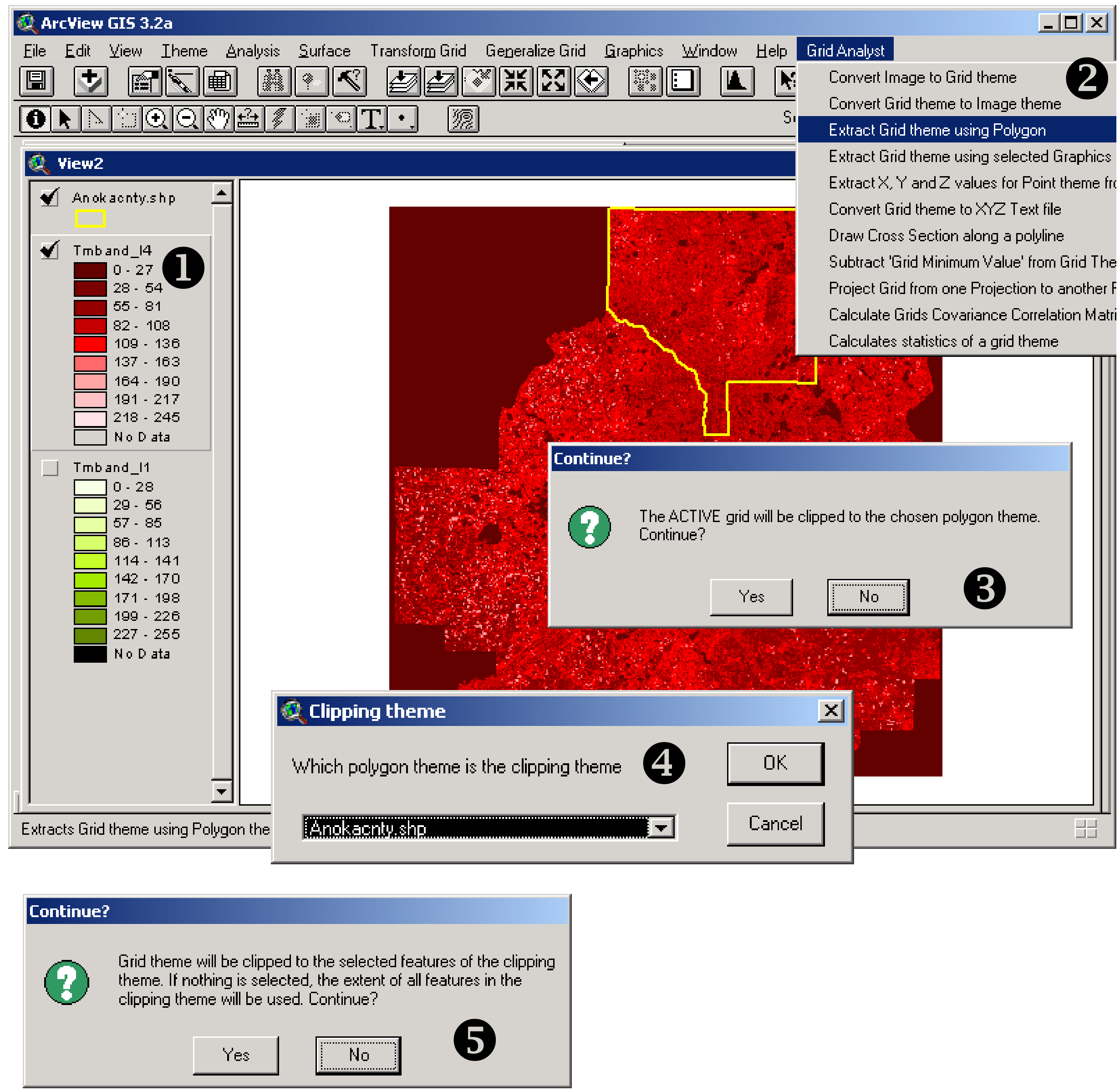
❷ Click on the **Extract Grid Theme using Polygon** item under the **Grid Analyst** menu pull-down.

❸ Click the **Yes** button to accept clipping the active Grid theme.

❹ Select the proper polygon theme that will clip the Grid. Click OK to continue.

❺ Click the **Yes** button.

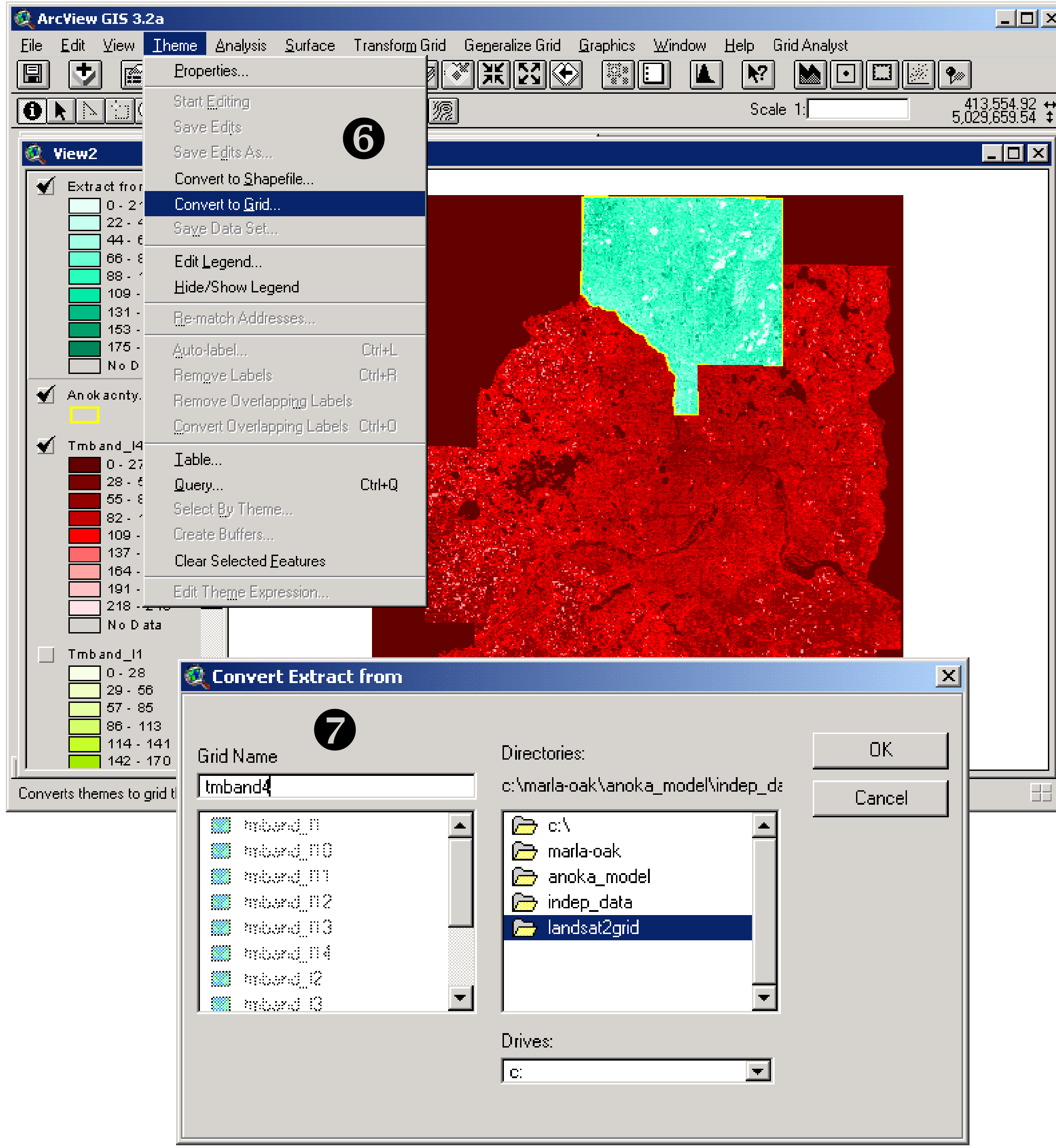
(continued)



(II)
Clipping GRID Surfaces
Using GRID ANALYST extension (cont.)

❻ Select the **Convert to Grid** item under the **Theme** menu pull-down and save the clipped Grid to the desired location with the desired name. We suggest that each clipped Grid be saved to a separate subdirectory.

❷ The Convert Grid dialog window opens. Browse to the appropriate directory and name the clipped Grid as desired. These Grids can now be loaded into the View Window as independent data Grids

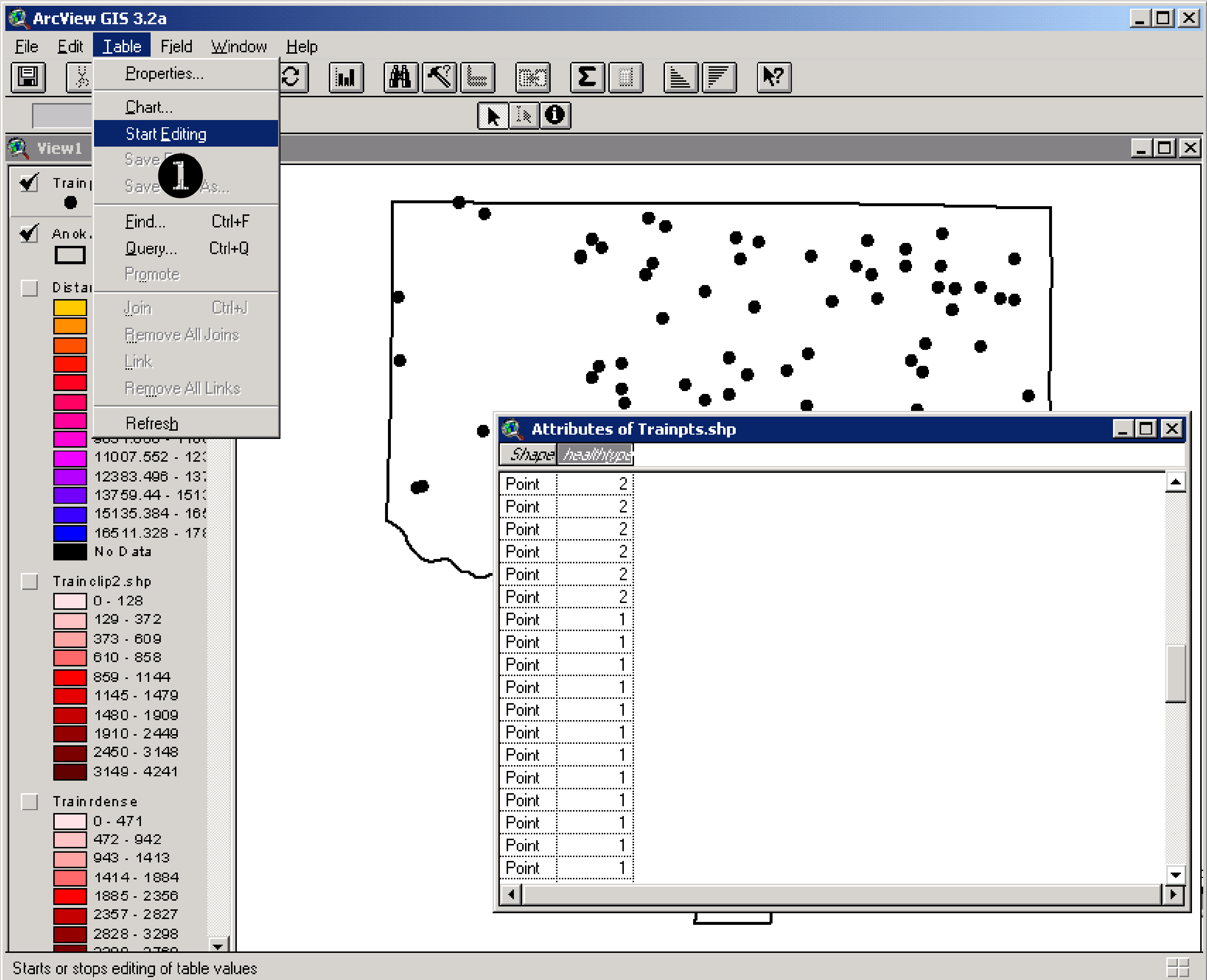


(III)
Create the Spatial Model Spreadsheet
Start Creating the Model Spreadsheet

The spatial model spreadsheet is initially created from the Dependent Variable theme. When the collection of independent data at each dependent sample point is completed, it is converted from a DBF to EXCEL.

An attribute must be created for each Independent Variable in the Dependent Variable themes table. For example, one independent variable data theme was *Density Of Roads Per Unit Area*. As a result, an attribute named ***rddense*** was added to the Dependent Variable theme's table.

❶ Open the theme's table and make it the active document. To add an attribute to a theme's table click on the **Start Editing** item under the **Table** menu pull-down. This will set the table to editable allowing the user to modify the table document.



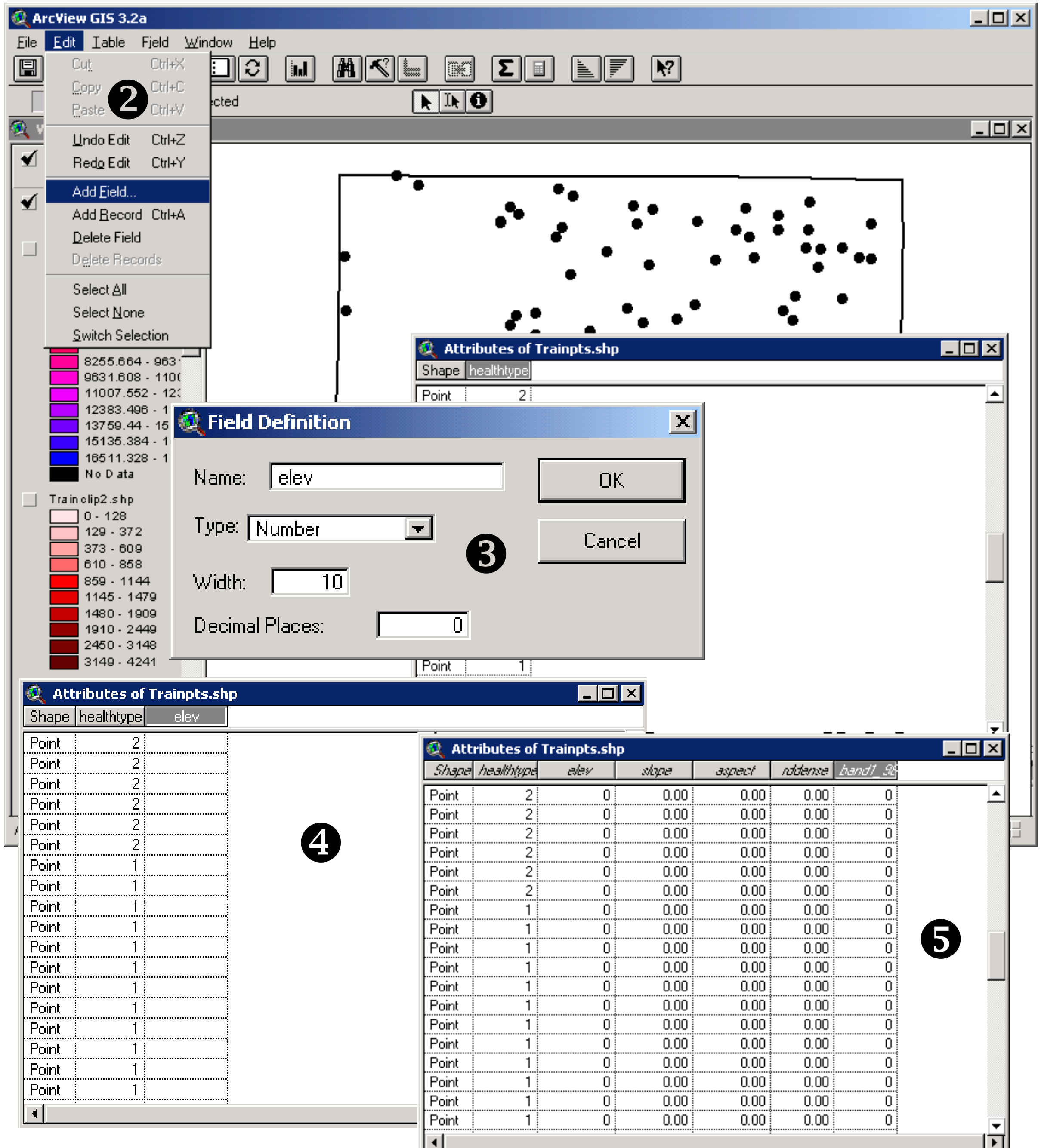
(III)
Create the Spatial Model Spreadsheet
Add Independent Data Attributes

❷ Click on the **Add Field** item under the **Edit** menu pull-down. This will open the **Field Definition** dialog.

❸ Enter the new field name in the **Name:** input slot. Make sure that **Number** is selected in the **Type:** input slot. Adjust the **Width:** to an appropriate width value and set the **Decimal Places:** as necessary. When finished, Click the **OK** button to add the new field to The Dependent Variable theme's table.

❹ The new attribute is loaded into the table. Repeat this process for all Independent Variable GRID themes in your project.

❺ When You have finished loading all attributes, click on the **Stop Editing** item under the **Table** menu pull-down.



(III)
Create the Spatial Model Spreadsheet
Populate Spreadsheet Attributes

❶ Click the **Get Cell Value** button to start the process of populating the Dependent Variable table (model spreadsheet).

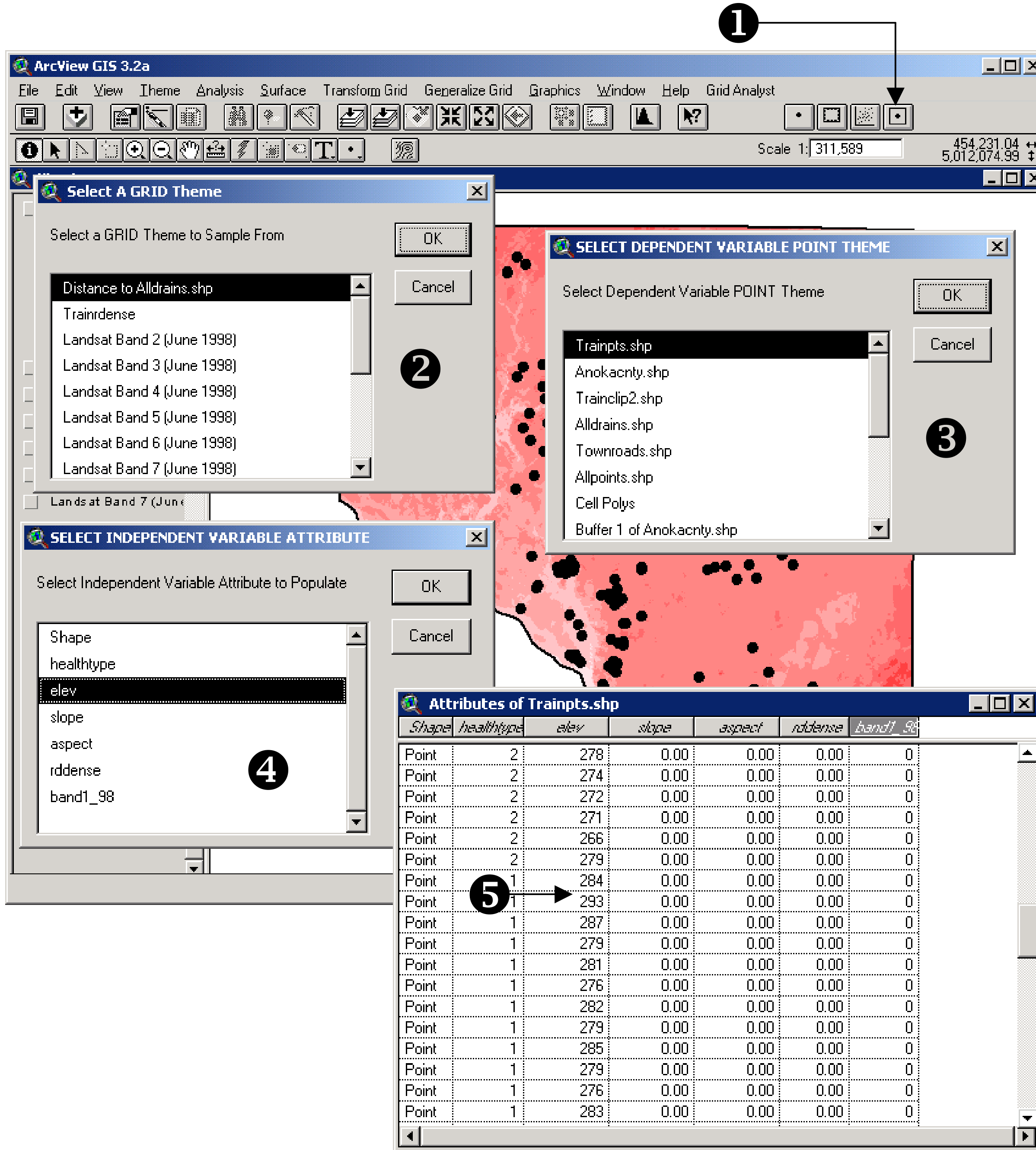
❷ From the **Select A GRID Theme** dialog, select the desired GRID theme from which to sample and populate the spreadsheet table. Click the **OK** button to open the next dialog.

❸ The **Select Dependent Variable Point Theme** dialog opens. Select the Dependent Variable theme and click the **OK** button.

❹ The **Select Independent Variable Attribute** dialog opens. Select the appropriate attribute To populate (in this example the *elev* attribute). Click the **OK** button and the system automatically populates each sample point record with the cell value of the GRID.

❺ The attribute is now populated. Repeat steps 1- 4 until all attributes are populated.

(Continued)



(IV)
Spatial Modeling in SPLUS
Starting Out

This section explains how to import the Sample Points DBF table, modify attributes, and run the Regression Tree procedure.

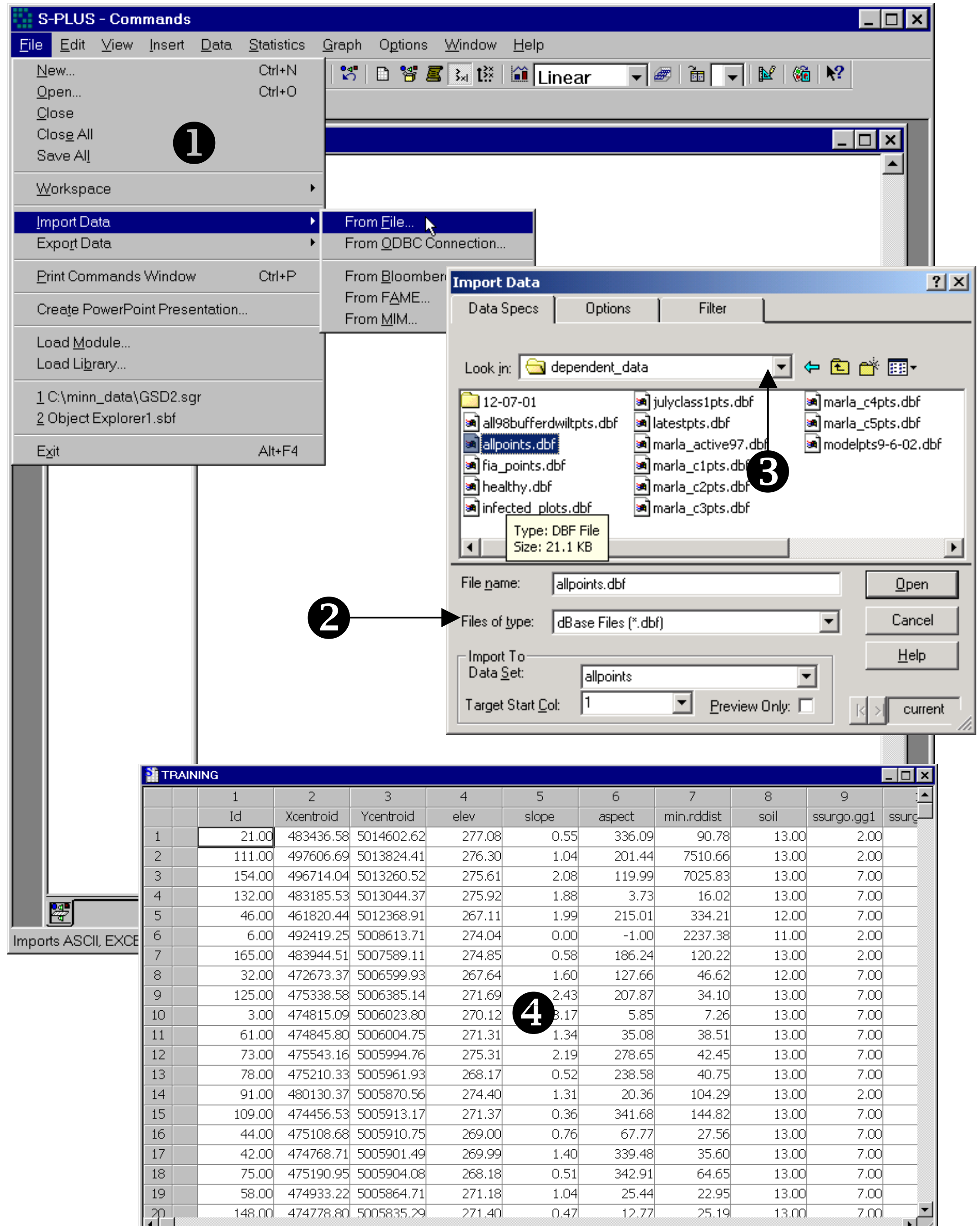
NOTE: The Custom Spatial Library from Robin Reich (Colorado State University, Dept of Forest Science) is not required for the Regression Tree Analysis.

❶ Open SPLUS and click on the **Import Data - From File** item under the **File** menu pull-down. This opens the **Import Data** dialog.

❷ From the **Import Data** dialog, find the **Files of Type:** input slot located towards the bottom of the dialog window. Select the **dBase Files (*.dbf)** option.

❸Next, browse to the directory where the point theme DBF file resides. Highlight the file and click the **Open** button.

❹ The spreadsheet them loads into SPLUS and becomes an SPLUS object.

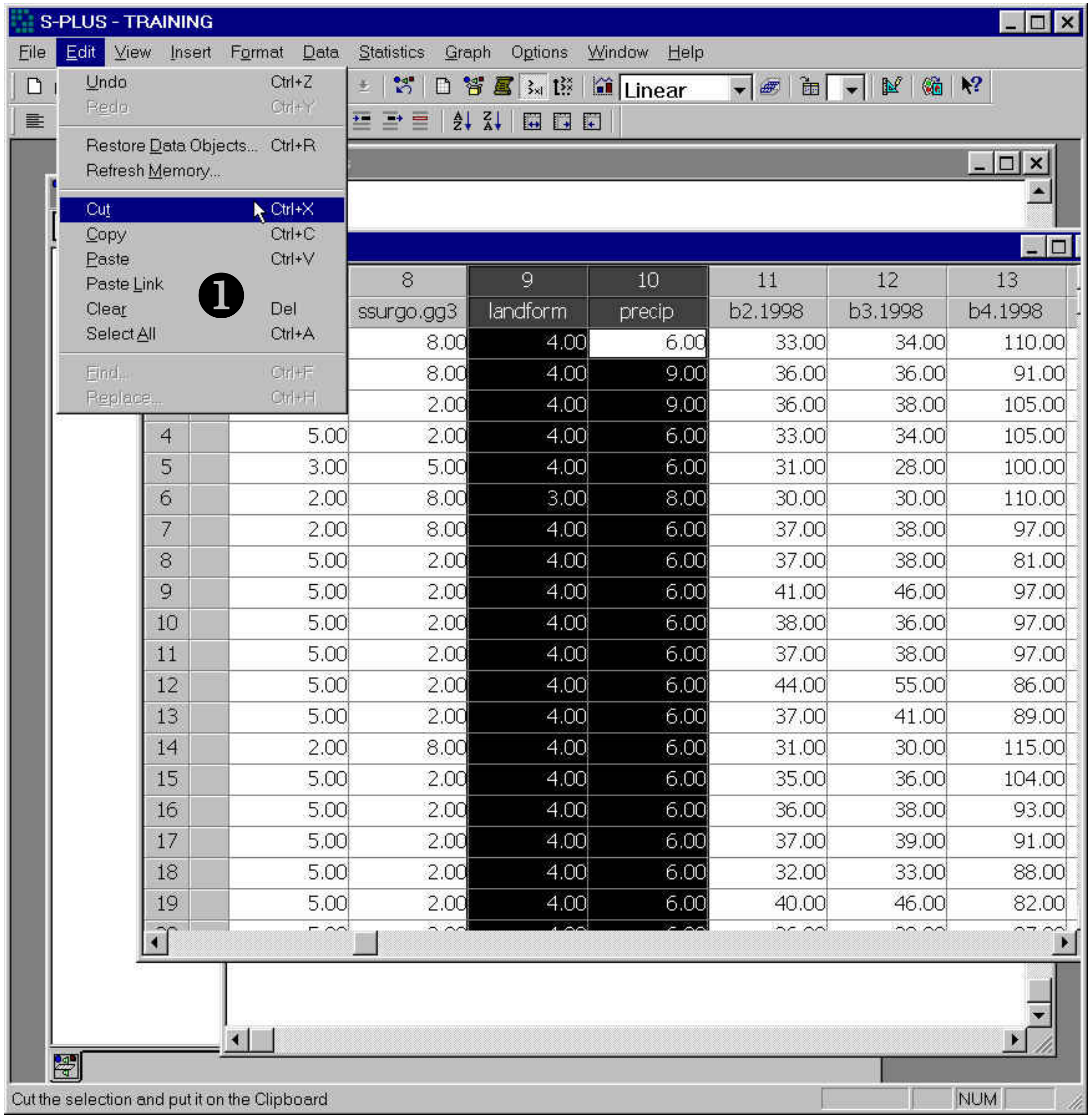


(IV)
Spatial Modeling in SPLUS
Modifying The Spreadsheet in SPLUS

Extraneous or questionable attributes can be deleted. An example of extraneous attributes may include those attributes that do not describe the dependent variable such as ID numbers, coordinates, etc.

Questionable attributes include those that were collect from bad data or obviously out of scale to the dependent variable.

❶ To delete attributes, highlight the attribute(s) or attributes to remove, then click the **Cut** item under the **Edit** menu pull-down. The attributes will be removed automatically.

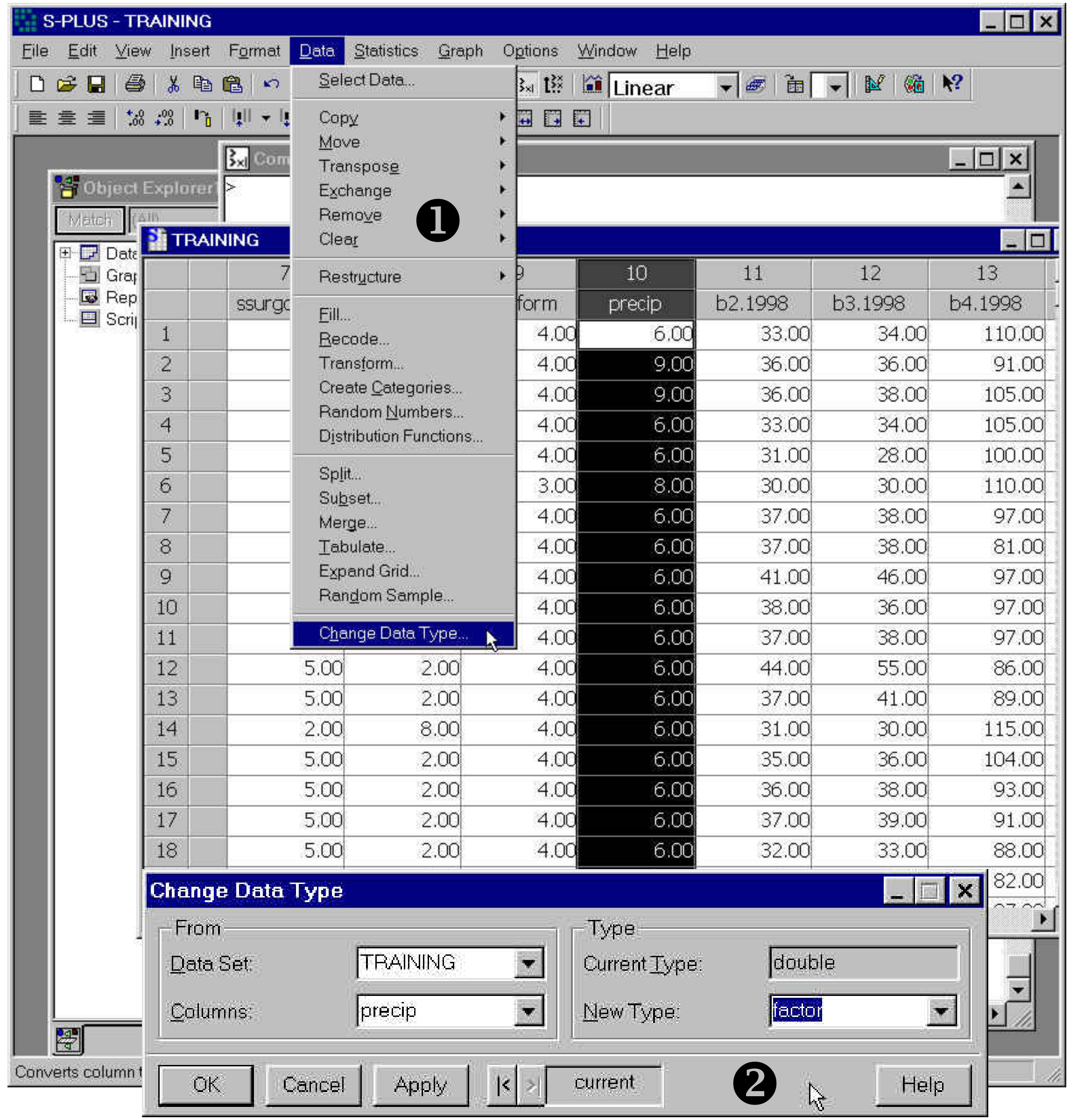


(IV)
Spatial Modeling in SPLUS
Changing Attribute Type

If any of the attributes contain discrete values (integer values that represent a class) then those attributes need to have their type changed to **Factor**.

❶ From the table, select the attribute to change then click on the **Change Data Type** item under the **Data** menu pull-down. This opens the **Change Data Type** dialog.

❷ From the **Change Data Type** dialog, find the **New Type:** input slot located in the right lower portion of the dialog window. Select the **factor** option and click the **OK** button. The field will automatically change to type factor.



(IV)
Spatial Modeling in SPLUS
Running the Classification TREE Analysis

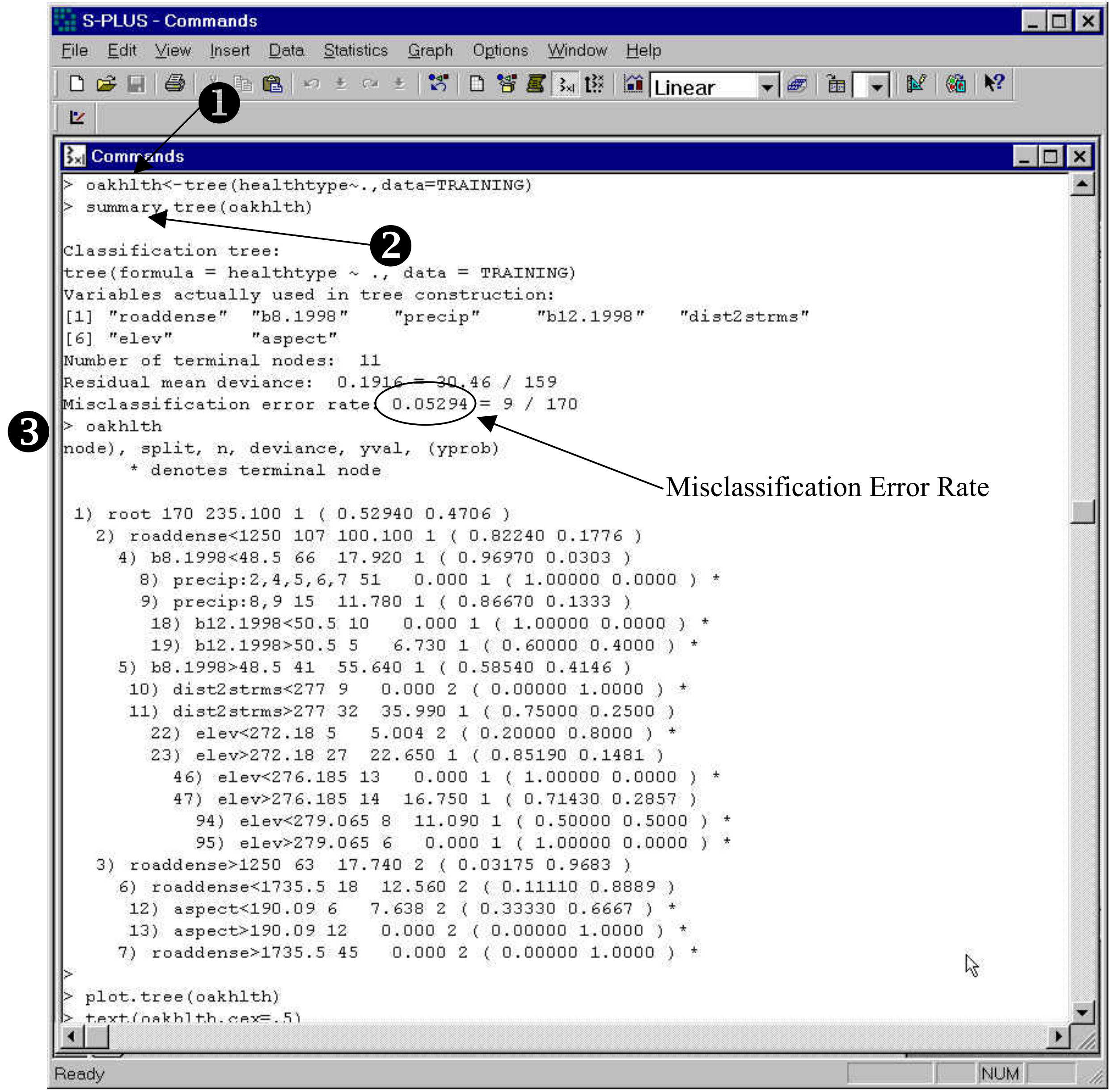
The TREE command is a non-parametric binary classification analysis. You could say that it is a non-parametric supervised classification. The results of the TREE command are the independent variables that are significant in describing the dependent variable, the misclassification rate (sample based), and the code needed to breakdown the tree classification structure.

❶ To start, type:
>oakhlth<-tree(healthtype~.,data=TRAINING)

❷ Next, type:
>summary.tree(oakhlth)

Notice that the program shows the misclass-ification rate (0.05294 in this example). The sample based accuracy can be calculated by subtracting the misclassification rate from 1 and multiplying by 100. (1-.053 = .947*100 = 94.7% accuracy)

❸ To get Tree code, type:
>oakhlth



(IV)
Spatial Modeling in SPLUS
Running the Classification TREE Analysis

The.

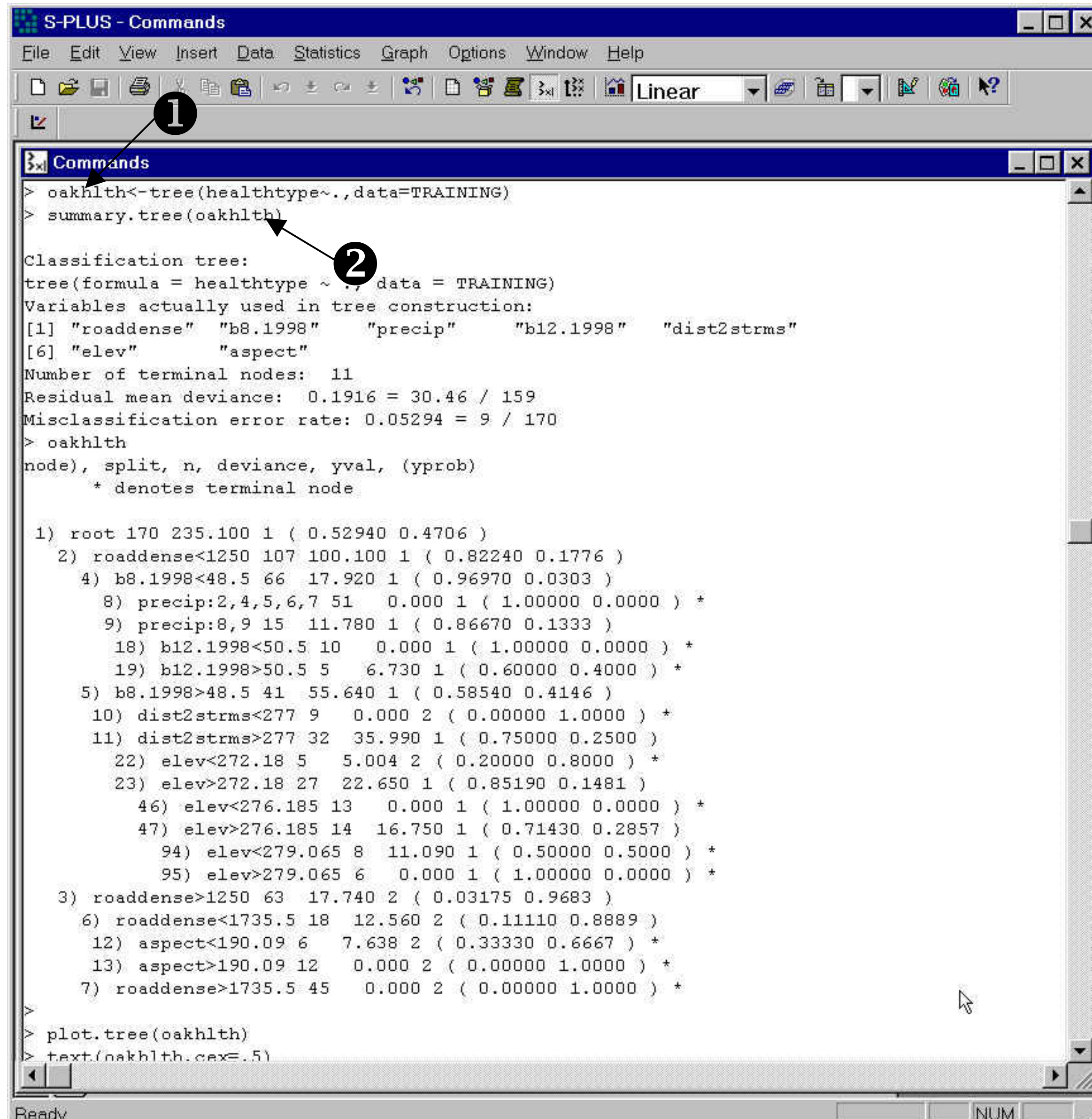
❶ To start, type:
>oakhlth<-tree(healthtype~.,data=TRAINING)

❷ Next, type:
>summary.tree(oakhlth)

Notice that the program shows the misclassification rate (0.05294 in this example). The sample based accuracy can be calculated by subtracting the misclassification rate from 1 and multiplying by 100. (1-.053 = .947*100 = 94.7% accuracy)

❸ To get Tree code, type:
>oakhlth

❸



(IV)
Spatial Modeling in SPLUS
Plotting the Classification TREE

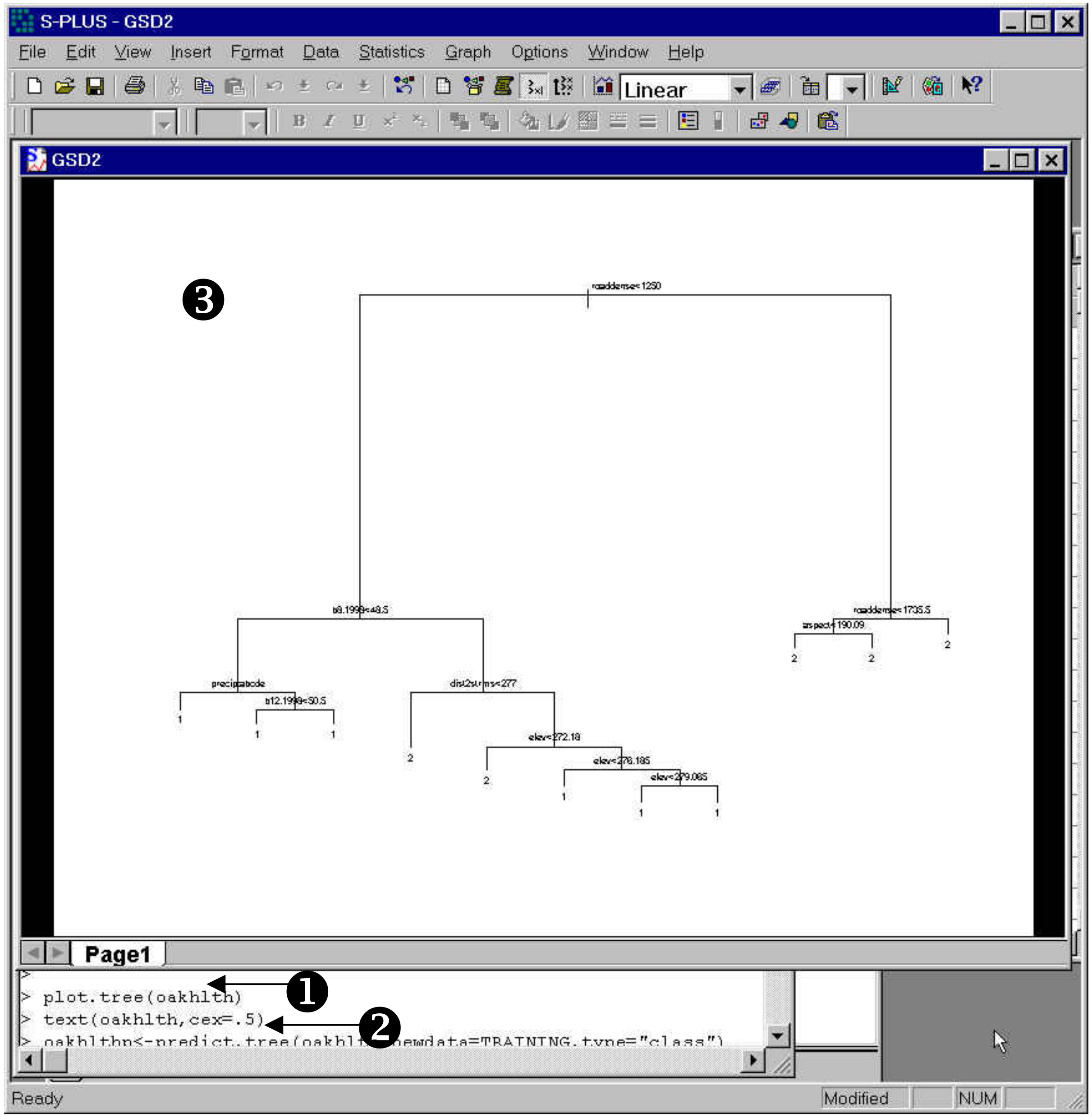
❶ Type:
>plot.tree(oakhlth)

The classification tree plot will open, however, it doesn't yet have text labels

❷ To add text labels, type:
>text(oakhlth,cex=.5)

The plot is now labeled with the significant independent variables and associated values where the breaks for different classifications occur.

❸ The classification tree plot.



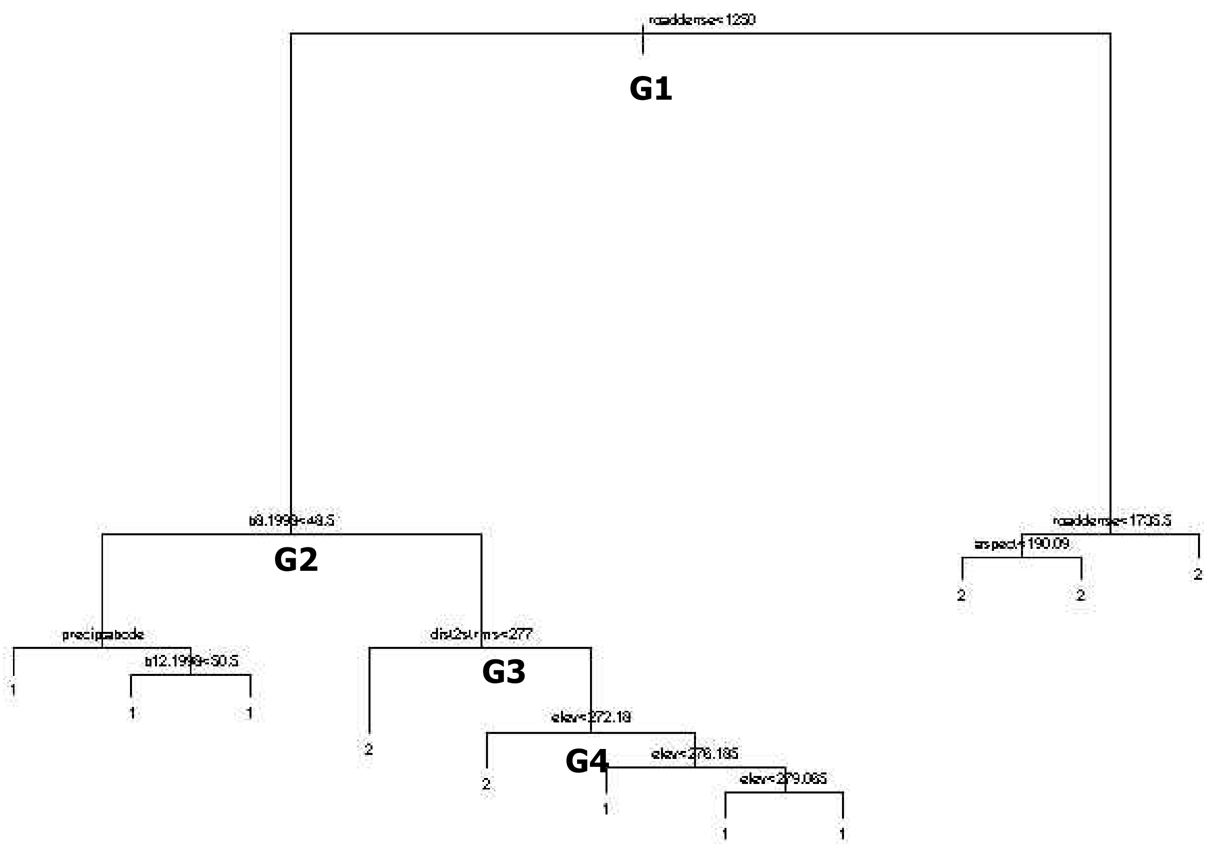
(V)
Creating the GRID Trend Surface
Creating the CON Statement

Creating the CON statement will allow the GIS to create a new GRID Trend surface based on the structure of the Classification Tree. The example to the right is fairly simple, consisting of only four break points (labeled G1-G4).

The ArcView Spatial Analyst CON structure consists of the following structure:

(inGrid expression).Con(yesGrid, NoGrid)

The aGrid.Con (yesGrid, noGrid) request performs a conditional if/else evaluation on a cell-by-cell basis. aGrid can be any valid Boolean or relational expression involving multiple Grids and Numbers (after being converted to Grids with aNumb.AsGrid). Cells for which the expression is TRUE are given the value found in yesGrid. Cells for which the expression is FALSE are given the value found in noGrid. If aGrid is a single Grid, then cells which are non-zero are given the value found in yesGrid, while values of 0 are given the value found in noGrid. The yesGrid or noGrid can be a single Grid, or any valid expression involving operators and requests that result in a Grid object.



relational expression　CON　True Val　False Val

G1 = ([rddense] < 1250.asgrid).con(G2, 2.asgrid)

G2 = ([b8_1998] < 48.5.asgrid).con(1.asgrid, G3)

G3 = ([dst2strms] <277.asgrid).con(2.asgrid, G4)

G4 = ([elev] < 272.asgrid).con(2.asgrid, 1.asgrid)

(V)
Creating the GRID Trend Surface
Creating the CON Statement

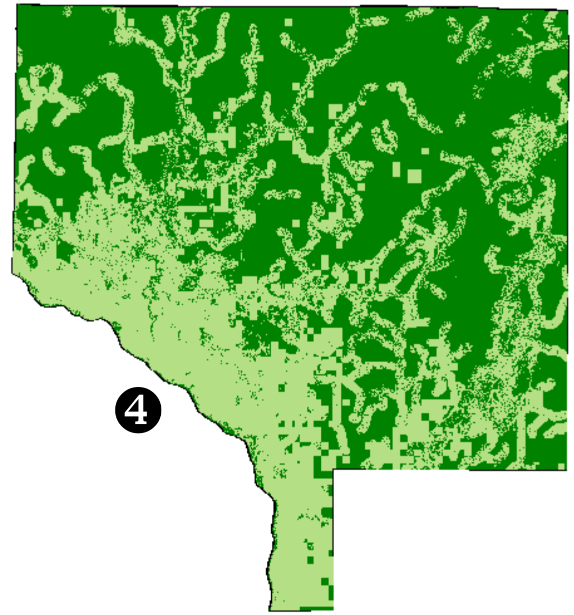
The best way to start is to create a CON statement for each classification tree break point. Refer to the previous page to see the break points found in the classification tree example.

❶ Create each of the required CON statements starting with the bottom break points and working up to the top most break Point.

❷ Add the CON statement from the last break point into the position containing the zero value of the next higher level CON statement.

❸ Repeat this for the remaining CON statements until the final CON statement is created.

❹ Add the finished CON statement into the Map Calculator of Spatial Analyst to create the new GRID.



❹

oakcond = ([roadense]< 1250.asgrid).con(([b8.1998] < 48.5.asgrid).con(1.asgrid, ([dist2strms] <277.asgrid).con(2.asgrid, ([elev] <272.asgrid).con(2.asgrid, 1.asgrid))), 2.asgrid)

❸

G1 **([rddense] < 1250.asgrid).con(*****, 2.asgrid)**

❷

G2 **([b8_1998] < 48.5.asgrid).con(1.asgrid, *****)**

❷

G3 **([dst2strms] <277.asgrid).con(2.asgrid, *****)**

❷

G4 **([elev] < 272.asgrid).con(2.asgrid, 1.asgrid)**

❶

(V)
Creating the GRID Trend Surface
Creating the CON Statement

The best way to start is to create CON Statements for each classification tree break point. Refer to The previous page to see the Break points found in the classification tree example.

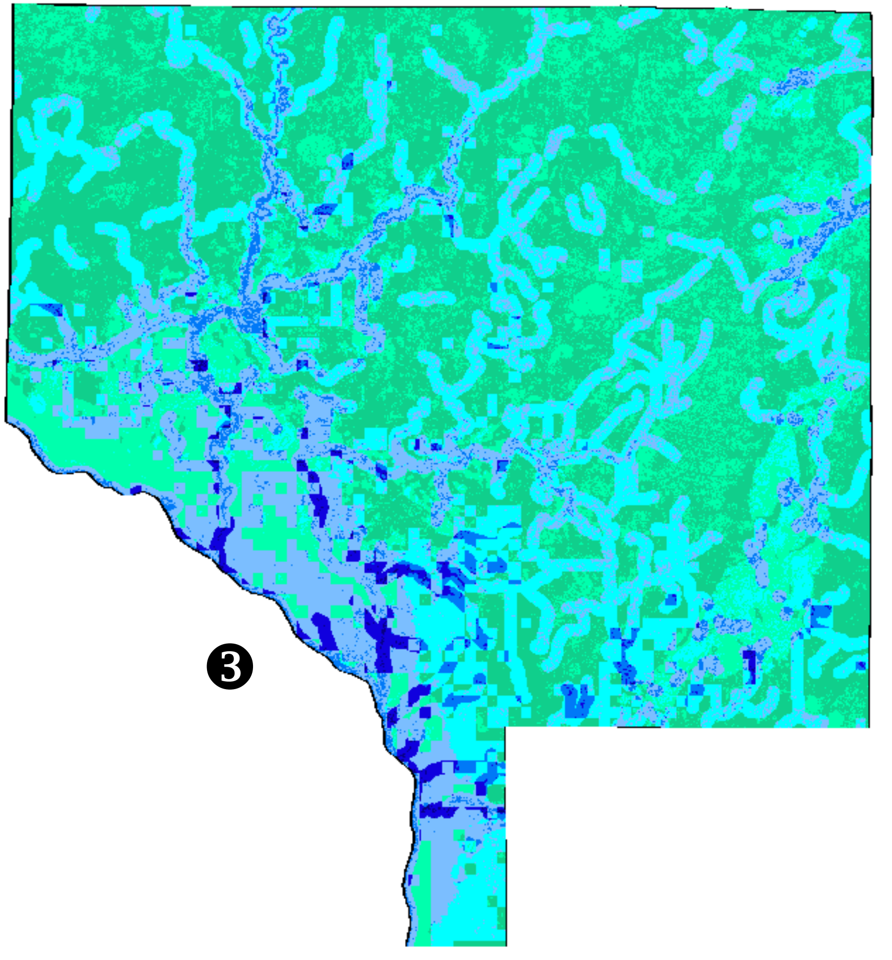
❶ The CON statements that create a new GRID for each Classification Tree break point.

❷ You can add all the separate GRIDs together to create a Sum-Of-Effects GRID that contains shows differing levels of oak, **However, this may not have any true meaning, so be sure to double check its accuracy before using it in any quantitative way.**

❸ The Sum-Of-Effects GRID.

❶
```
Grid1 = ([rddense] < 1250.asgrid).con(0.asgrid, 2.asgrid)
Grid2 = ([b8_1998] < 48.5.asgrid).con(1.asgrid, 0.asgrid)
Grid3 = ([dst2strms] <277.asgrid).con(2.asgrid, 0.asgrid)
Grid4 = ([elev] < 272.asgrid).con(2.asgrid, 1.asgrid)
```

❷
```
OakCond = ([Grid1]+[Grid2]+[Grid3]+[Grid4])
```

❸


(V)
Creating the GRID Trend Surface
10 Fold Cross Validation

Future Text